The ELECTRICAL REVIEW

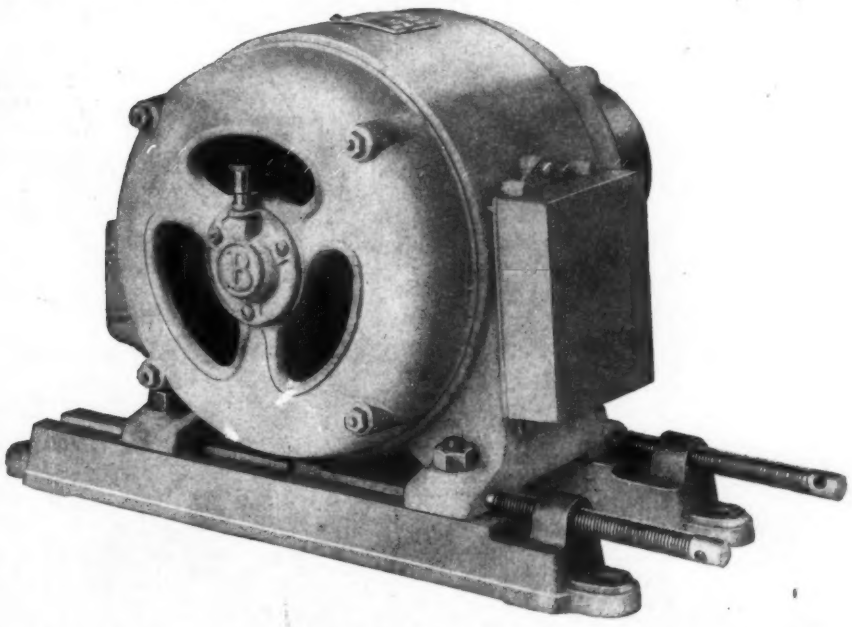
FOUNDED 1872

CXVII 3009 [All Rights Reserved.] JULY 26, 1935 [Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage] PRICE SIXPENCE

Small Electric Motors

For Two Wire Alternating Current Supply 200-250 volts

● STARTING—very rapid, will start any machine without loose pulley. ● CONTROL—Motor operates from simple double pole switch, only two wires are necessary. ● RELIABILITY — Indestructible rotor, no rubbing parts when in motion, nothing complicated to go wrong. ● PERFORMANCE—Very efficient in operation.



● INITIAL COST — of this type is very low. ● DELIVERY can be effected in a few days from receipt of order. ● ENDURANCE—A motor of this type has made over 50,000 starts against load in our works. ● RANGE—from quarter to three Horse Power at various speeds. ● DETAILS—List No. 384 will be sent without obligation.

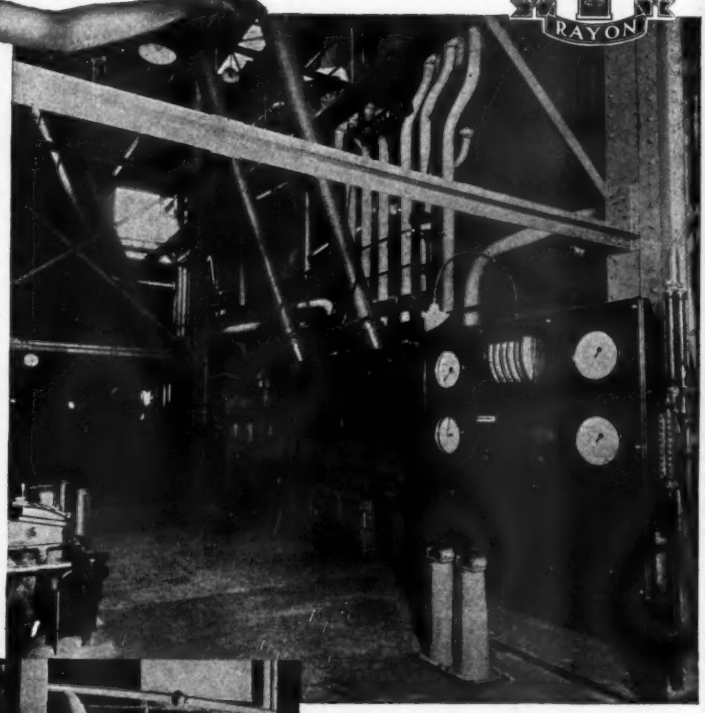
BROOK ELECTRIC MOTORS

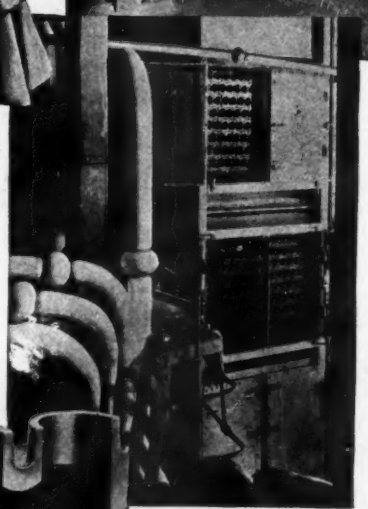
PRODUCTS OF BROOK MOTORS LTD • EMPRESS WORKS • HUDDERSFIELD

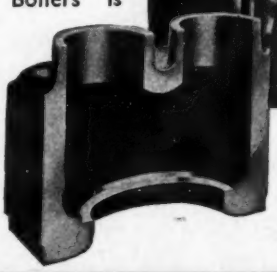
PIONEERS IN INDUCTION MOTOR DESIGN FOR OVER THIRTY YEARS

LIBRARY
UNIVERSITY OF WASHINGTON
SEATTLE

Beautiful Fabrics and Bailey Furnaces







COURTAULDS LIMITED
COVENTRY

Three Bailey Furnace equipped B. & W. Boilers have recently been put into commission, each for a normal evaporation of 50,000 lbs. of steam per hour at 350 lbs. per sq. inch & 725°F.

Each of these Boilers is equipped with a B. & W. steel tube economiser of flash welded construction, paddle ash extractors, and B. & W. Style 28 Stokers.

The illustrations show :—

1. Firing aisle.
2. One of the economisers with access doors open.
3. A section through one of the economiser head pieces, the hand hole fitting in which permits a visual inspection of the tubes and easy cleaning. Absence of any space where air pockets might form will be noted.

Twenty B. & W. Boilers have been supplied to Courtaulds Limited.

The Cornwall, Ontario, plant of Courtaulds (Canada) Limited has an installation of three Bailey Furnace equipped Boilers.

BABCOCK & WILCOX
LIMITED
BABCOCK HOUSE, FARRINGDON ST., LONDON, E.C.4

Rotal

The
Electrical Review

VOL. CXVII. JULY 26, 1935. No. 3009.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.
Published every FRIDAY. Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.
Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).
The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.
SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

Index to Advertisers—See page xl.

Principal Contents:

	PAGE
The Management of Industry	105
The Production of Moulding Materials	108
Battery Eliminators for Telephony. By D. M. Duinker	110
Greenhouse Heating by Electricity. By V. Sinclair	111
Domestic Hot Water. By H. Smith	114
Measuring Vacuum Cleaner Suction. By J. Southworth	114
Electricity in a Youth Hostel	115
The I.E.E. Wiring Regulations. By E. W. C. Day	116
Correspondence: Immersion Water Heaters; Portable Alkaline Batteries; The Protection of Domestic Installations; New Methods in Agriculture; Electricity in the Laundry	117
Lead Extrusion	118
New Apparatus and Devices	119
Sweden's Foreign Electrical Trade	121
In the Courts	122
Business Notes	123
Electricity Supply	126
Traction	128
Communications	128
Contract Information	129
Notes	130
Our Personal Column	131
Financial Section	132
Patent Specifications	135
New Work for Contractors	136

The Management of Industry

AFTER several days devoted to the consideration of numerous papers on subjects which come under the comprehensive description of scientific management, the International Congress came to a close at Westminster last week, when the final address was delivered by His Royal Highness the Prince of Wales.

For some years past the Prince has been, as he said, a very keen student of industrial affairs in all parts of the world, and in his various speeches he has demonstrated the possession of a mind quick to grasp both the commercial conditions prevailing in overseas markets and the circumstances of manufacturing organisation and activity at home.

In the course of his remarks he seemed to fasten specially upon the close relationship that exists between technical development and management in industry and trade as they operate to-day. Management which is blind to the importance of full utilisation of technical development stands no better chance in the industrial world of to-day than does a technical absorption which renders the minds of important officials oblivious of the new factors which form part of modern management.

The great objective of the Congress was the spread of scientific management, and the end sought—efficiency in production and efficiency in trade—will be gained only by a definite co-operation of the best faculties of both kinds. We must have specialisation, but science and industry are by their nature partners and must not establish themselves in separate cubicles, or regard each other with suspicion.

We have devoted a good deal of space in the ELECTRICAL REVIEW during the past few years to the efforts that have been made by industrial organisations and by specialists employed on the staffs of large manufacturing and trading concerns to forecast future trends and developments. We have been passing through a protracted period when unsettled conditions in most parts of the world have made the preparation of accurate forecasts well-nigh impossible, but that does not remove the necessity for concentration upon measures of this kind now that improvement is taking place both at home and overseas. Of course, unexpected happenings may upset our best calculations, but if we wait for complete stability we shall never get anywhere.

We hope that one of the ways in which the Congress will bear fruit will be in the presence amongst us of a greater readiness to adopt any such measures as are calculated to promote industrial and trading efficiency.

We have been too prone to regard studies of trends and tendencies as academic, and have found it easy to be unduly sceptical concerning their value to us either in making reliable production plans or in preparing suitable selling organisations.

From an industrial people which can only return to full prosperity by securing a large share of trade, the modern world calls for the use of every efficient means of increasing our adaptability to conditions totally different from those which prevailed a few years ago.

Earl's Court Again

WHEN discussions have taken place regarding the holding of big electrical exhibitions in London it has sometimes been said that Olympia was generally booked up long in advance and was unavailable at the particular part of the year when an electrical show would be most effective; further, that there was no other suitably situated hall within the metropolitan area large enough for our purposes. If the scheme for building the largest and most completely equipped permanent exhibition and large-scale entertainment centre in the world at Earl's Court is carried out the subject assumes an altered aspect. It is noteworthy that the Olympia Company contemplates the possible loss of certain exhibitions in 1937 and may go slow in dividend distributions until it is satisfied that the revenue will be maintained by other lettings. While the company says that the arrangement for holding the British Industries Fair there does not ex-

pire until 1939, we read elsewhere that the new Earl's Court "must be completed by the end of 1936 and part of the London Section of the B.I.F. will be held there early in 1937." The Motor Show and the Ideal Home Exhibition are both to be moved there. The building scheme will give employment to 2,000 men for eighteen months, and our readers will find it interesting to visualise how substantial and original will be the electrical installation work for a really modern structure on a nineteen-acre site.

Greenhouse Heating

IN the height of summer it is often difficult to give proper consideration to winter problems. Frost and cold seem so remote that there is a tendency to "shelve" such matters as the winter care of plants until the September mornings bring with them the first shiver that marks the end of summer. But now is the time to do something if arrangements have not been made already or if existing methods are unsatisfactory, and Mr. V. Sinclair's article in this issue should serve as a useful guide. This time he deals principally with air-heating as opposed to soil-heating, which he covered on an earlier occasion. The three systems described are heating by means of suspended cables, tubular heaters and electrode boilers. The principal advantage of the electrical method is, as usual, the ease of control, but it is necessary that the cost of electricity shall not be excessive. What are the possibilties for greenhouse heating as a night load at special rates?

B.E.A.M.A. Appointments

THE Council of the B.E.A.M.A. last week dealt with the duty of appointing a successor to the difficult position held by the late Mr. D. N. Dunlop. Mr. V. Watlington, who was chairman of the Association for three years, was appointed joint director with Mr. Dunlop three years ago. The Council has wisely adopted the only course which could ensure continuity of policy in matters of importance by vesting him with the sole responsibility for the directorship, and appointing Mr. C. Rodgers, who has been Secretary since the year 1921, as Deputy Director.

Functions of 1935 and 1936

FROM information provided by various institutions, associations and other organisations and interests, the Institution of Electrical Engineers has compiled a programme of events of a social and technical character for which dates have already been decided upon between August, 1935, and July, 1936. The list will be of value to all who will be responsible for the arrangement of other events so that undesirable clashing of dates may be avoided.

Blighted Hopes

THE high opinion in which electricity is held by some people is sometimes an embarrassment to electrical men. It is often imagined, for instance, that a simple bowl fire is capable of warming a room of considerable size in the depth of winter. And now Mr. H. Smith, who contributes to this issue, has discovered a case in which a 750-W immerser is expected to heat up the contents of a 30-gal. tank in next to no time. Such touching confidence in the powers of electricity is flattering but likely to meet with disappointment.

Interference with Radio

THE all-mains receiving set is one of the best electrical missionaries, as has often enough been pointed out, but its value can be seriously depreciated by interference from other electrical apparatus. Moreover, the frequency band width has to be cut to about four kilocycles in order to secure good reception of a large number of stations. Manufacturers would be prepared to go to a much higher response figure, if this did not increase the liability to interference, thus enabling people with a sensitive ear for quality in music to enjoy foreign programmes. An I.E.E. Committee has been brooding over the subject for 2½ years, but with so little effect that the *Wireless World* suggests that the Postmaster-General would now be justified in seeking legal powers to control interference. The definition of "tolerable interference" is being considered by the International Electrotechnical Commission, but the precise degree appears to be of little importance in the large majority of cases. That something could be done now is evident from the far-sighted action of a few manufacturers of electrical appliances in designing these so as to cause no offence to the radio public. The electrical industry likes to assert its ability to put its own house in order, but too often it takes its own time about it. Meanwhile, the cost of remedying the conditions increases rapidly. Will this prove to be yet another case in which failure to submit agreed proposals will cause a plan to be imposed from outside?

Tractor Reliability

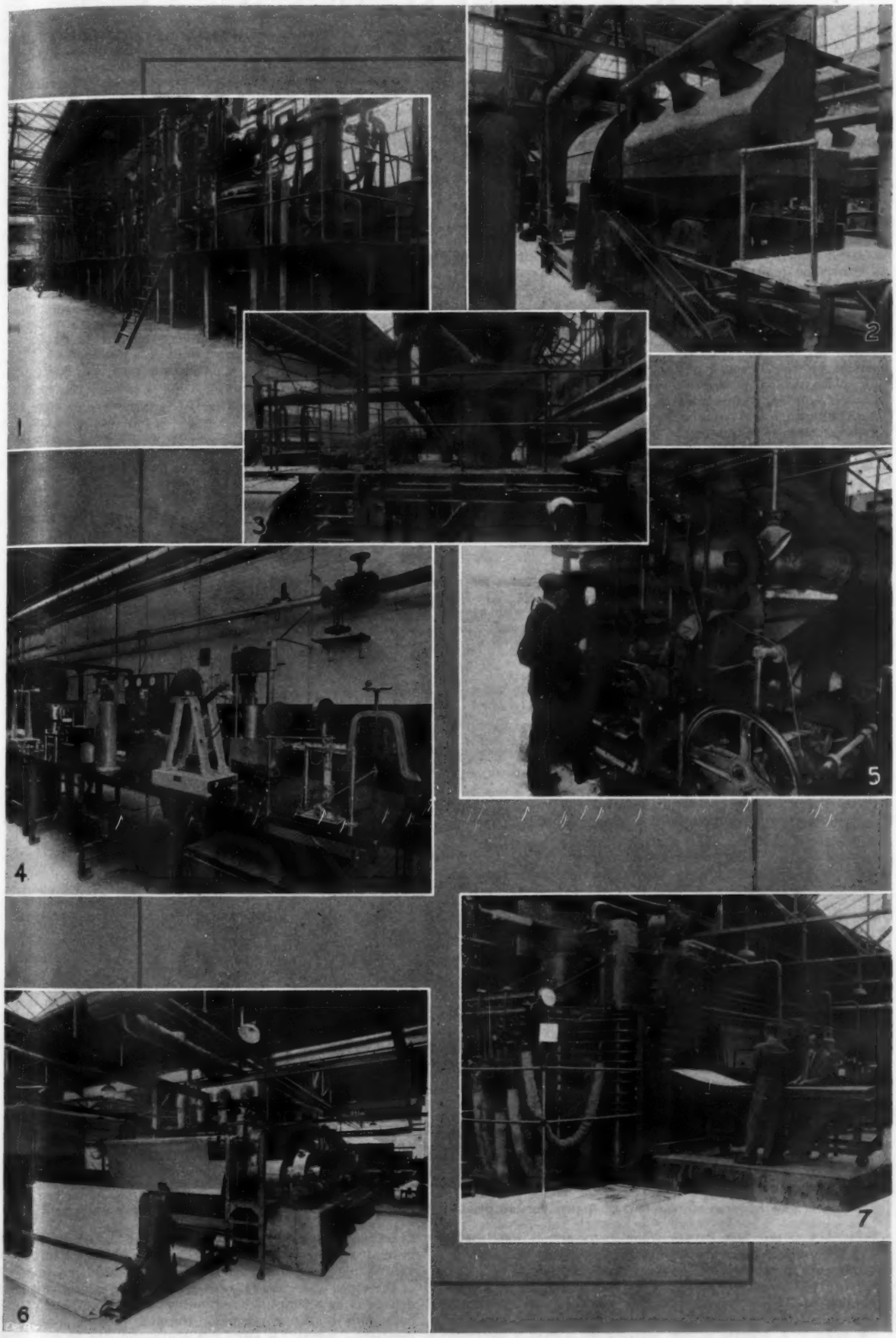
WITH the recent completion of twenty-two electric locomotives for the Hungarian State Railways, the Budapest-Hegyeshalom line (with the exception of a few local trains) has been entirely changed over to electric traction. Experience with the first four tractors shows that the highest expectations have been realised. No difficulties were to be expected with the sub-station equipment, traction motors and other gear of the more normal kind supplied by the Met.-Vick Co., but some "teething troubles" might have been reasonably looked for in the operation of the somewhat complicated phase-changers and automatic regulators under the Kando system. However, the phase-changer of the first passenger locomotive has now been in service for over 200,000 miles without requiring maintenance, which would be a creditable performance even with simpler d.c. plant. The effect of taking single-phase supplies from the national three-phase network is said to have caused no disturbance to power and lighting consumers. A point to be noted is the use of one type of locomotive for both passenger and freight traffic. This has been found to have many advantages, including the simplification of the make-up of time-tables.

Lock, Stock and Barrel

THE offer for sale of a complete 20,000-kW power station by the Bournemouth and Poole Supply Co., is a portent. It follows the taking of a supply direct from the grid and the conclusion of the frequency change-over from 100 to 50 cycles. The plant should still be capable of quite good service; but is it to the ultimate interest of anyone that displaced plant should be re-erected? The result of doing so is either a loss of equivalent load to a supply undertaking or of work to a manufacturer. The question of forming a pool to buy up old plant to prevent its installation elsewhere, as was suggested by Mr. H. Hobson at Bournemouth, should be one for consideration by more than the supply section of our industry.

Electricity and Steam

THERE is nothing really novel in the proposal to erect a thermal-electric station at Worksop. As Mr. Monkhouse has shown there are many stations in operation in Russia in which the steam from pass-out turbines is used for process work in adjoining factories and for raising the temperature of water for circulation as a heating medium over a wide area. In the present instance coal is available from a local colliery from which about 200,000 gallons of water per house is said to be pumped to waste, and an overall thermal efficiency of at least 60 per cent. should be obtainable, especially with a high boiler pressure. The chief problem will be to attract users of process steam to justify the building of a station large enough to make the most of the technical possibilities. In the United States stations supplying steam for outside use do not usually generate electricity. For the best results the ratio of raw steam to electricity should be high and the demands for the two services should be made at the same time, which is unusual.



Some Views of the Bakelite Works, Birmingham. **(See next page)**

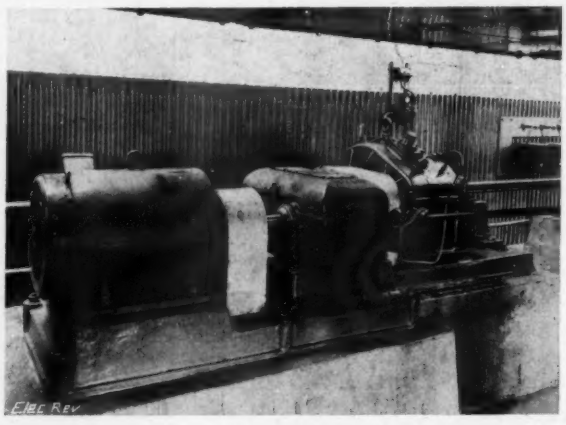
1. Stills in which resinoid is produced by chemical reaction of phenol and formaldehyde. 2. Equipment for breaking caked resin. 3. Resin pulverisers. 4. Some of the physical laboratory testing equipment. 5. Resin mixture is transformed into a plastic sheet on these rolls. 6. Driving side of paper impregnator for producing bakelite sheet. 7. Removing bakelite sheet from multiple daylight press

The Production of Moulding Materials

How bakelite is made

ELECTRICAL interest in the production of synthetic resin moulding material, at least as we saw it recently in the works at Birmingham of Bakelite, Ltd., is twofold. We were told by Mr. H. H. Lusty, an official of the company, that the electrical industry is the biggest sales field for bakelite and that electrical work calls for some of the highest working standards. Further, the factory equipment embodies an electrical driving installation of unusual interest.

We first had to get used to the idea that bakelite moulding powder, the raw material, as we have so often seen it in the moulder's hands, was the finished product in this instance. The main basic raw materials, apart from fillers and pigments, are phenol, formaldehyde and cresol, and the essential processes involved are the chemical reaction between phenol and formaldehyde to produce a resinoid, and crushing, mixing, filtering and rolling, with heating and cooling at various stages of the resulting resinoid with various fillers.



Drive for paper impregnator

Different fillers are used to obtain such special qualities in the material as high resistance to electricity and acids; the grades of the moulding powder are largely dependent on the amount and types of resinoid and fillers which they contain. This is particularly the case with some electrical moulding materials. Fillers are necessary for mechanical strength, and the problem is largely controlled by the thorough impregnation of the filling material.

The raw materials are stored in large tanks in the open, from which they are gravity fed into a portable tank for conveyance, via elaborate checking machines into digestors in the works. These digestors are of the steam-jacketed vacuum-pan type in which the water from the raw materials is evaporated, the vapour being drawn off by vacuum pumps. Precise control of the temperatures, pumping operations, and so on is essential in these early operations, and to this end there is an elaborate system of controls.

Each digestor is equipped with a stirrer, and the stirrers of each section are belt driven from motor-driven line shafting. Resinoids from the boiling pans are run off as thick fluids and, in the case of the solid materials, left to cool and solidify. The resins are roughly cracked by tipping in a cake breaker and then ground to a fine powder. All machines throughout the factory are electrically driven either direct or by belts. A feature of the installation is that a separate ammeter is provided on each motor circuit. All small motors are controlled by push-button direct-on starters. In the resin department the crackers are belt driven through 2-h.p. motors running at 720 r.p.m.

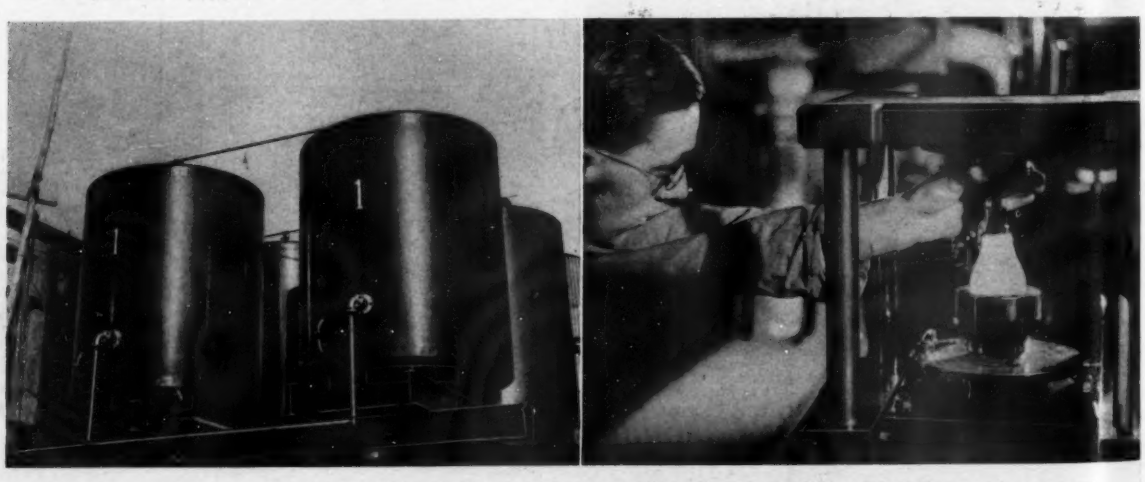
The grinders are driven by a 30-h.p. motor running at 450 r.p.m. equipped with a star-delta oil-immersed starter. The bulker is also belt driven by a 12-h.p. slip-ring motor running at 725 r.p.m. and equipped with an oil-immersed rotor resistance starter. Elevators are belt driven from line shafting.

The moulding powder department is a three-storey building with stores for the resins, fillers and pigments at the top. These materials, after weighing in the correct proportions, are tipped through holes in the floor directly into mixers. Under each hole is a self-contained plant devoted to the production of one particular grade of bakelite, but although these plants differ in many respects in construction, in principle they are similar, so it will be sufficient to refer to the most up-to-date unit. From the drum mixer the powder mixture is delivered through a gravity chute to steam-heated rolls which it leaves in the form of a plastic sheet. This sheet is then conveyed on an inclined cooling conveyor up to a crusher, cooling and setting en route. The crushed material is next sifted and mixed and the heavy oversize particles are removed by a sifter. Mr. F. J. Robinson, works manager, emphasised the great importance attached to mixing; thorough treatment in this way is afforded at three different stages in the processes already described.

After passing through automatic weighers, the material, now the finished product, is ready for despatch to the moulders. In the latest moulding material bay, the first mixer is driven by a 5-h.p., 720-r.p.m. motor through gearing, while the two bulkers which are similar in principle but serve to ensure uniformity of the finished material, are driven by 4- and 5-h.p. motors respectively, each running at 720 r.p.m. The rolls are driven through gearing by a 150-h.p. slip-ring motor running at 725 r.p.m. and controlled by an oil-immersed rotor resistance starter.

Bakelite laminated sheet which can be machined in any way is an important production of the company. Paper or fabric is impregnated with synthetic resin varnish, dried during its continuous passage through a long oven, cut into sheet of the required size and compressed while hot in steam-heated hydraulic presses. In the latest oven just installed the roll of untreated paper at one end is unrolled and passed through a varnish bath and the dried impregnated material is rolled up at the other end. A 7-ft. wide roll of paper is dealt with and driving is by a 7-h.p. motor running at 710 r.p.m. and driving both ends of the impregnator through variable gears. The resultant "board" is sawn into shape and size by circular or band saws for despatch. We saw some of the board being tested on a table micrometer to one tenth of a thousandth of an inch.

In a small section of the works devoted to making tubes of various sections for switch rocker arms, insulating sleeves, &c., we saw impregnated paper wound on mandrels on which



Left: Raw material storage tanks. Right: Torsion machine for testing adhesive qualities of bakelite capping cement

it was moulded, these mandrels being afterwards withdrawn.

Perhaps the best idea of the importance of the products to the electrical industry can be obtained from the testing laboratory in which we saw a considerable amount of electrical testing equipment. It will be a surprise to many readers to learn that moulding and laminated materials are subjected to forty standard physical tests in the physical testing laboratory. While we were in the laboratory small square tubes intended for switch rocker arms were subjected to a torsion test and withstood a torque of 20 lb./ft. Samples cut from laminated sheet and moulded from moulding powders are subjected to Izod impact tests and to tensile and compression tests in hydraulic testing machines.

Power factor at audio-frequency is measured on a Schering bridge, and for d.c. measurements a high sensitivity galvanometer is employed. Volume resistivities of the order of 10^{14} ohms per cm. cube have been obtained. There is a 100-kV transformer equipment for high-voltage testing of laminated sheet and moulded test pieces in accordance with British Standard Specification.

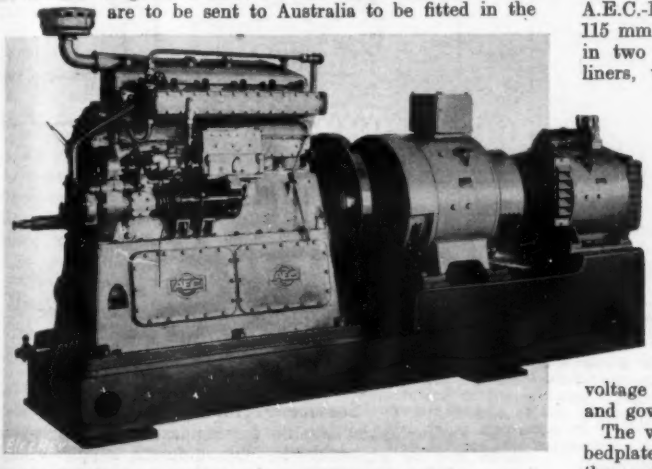
Control over raw materials and analysis of finished products is effected in the chemical laboratory. Accurate control is essential in order to comply with the increasingly stringent standards demanded by customers whose purchasing specifications are allowing narrower limits as the applications of the material extend.

The electricity supply is taken from the Birmingham Corporation at 11,000 V, 50 cycles, and the works sub-station contains a three-unit sheet steel cubicle switchboard which is the property of the Birmingham Corporation and a similar board belonging to the company. The latter board controls the supply to two power and one lighting transformers. The power transformers are of 650 and 550 kVA respectively and step down to 420 V. The l.p. side of the transformers is connected to a six-panel flat back switchboard (two feeder panels and four distribution panels). The lighting transformer is of 200 kVA, 220 V, and is connected to a four-panel switchboard.

In the summer months the lighting load is taken from the power switchboard and the feeder switches on the 220-V switchboard are so arranged that it is impossible to parallel the power and lighting transformers. A further sub-station is in the course of construction at the opposite end of the works.

A.E.C. Marine Engines

ONE of two similar six-cylinder oil engines for ships' auxiliary work was tested under Lloyd's supervision last week at the Southall works of the Associated Equipment Co., Ltd. These sets are similar in design to the company's compression-ignition industrial type of engine. They are of light weight and have a water-cooled exhaust. They are to be sent to Australia to be fitted in the



An A.E.C.-B.T.H. six-cylinder auxiliary set (50 kW, 110 V) for an Australian Diesel-electric ferry boat

double-ended ferry boat *Bellubera*, owned by the Port Jackson & Manley Steamship Co., which is being converted from steam to Diesel-electric drive.

The auxiliary sets are to provide the electricity for lighting and for driving the steering gear and engine-room pumps, as well as the excitation of the four 320-kW main generators to be used for propulsion on the system developed by the B.T.H. Co., Ltd.

Each engine drives in tandem two four-pole d.c. 115-V B.T.H. generators, one of 50 kW and the other of 9.6 kW; the maximum speed is 1,650 r.p.m., 85 b.h.p. being developed at 1,500 r.p.m. The engines operate on the four-stroke cycle and have A.E.C.-Ricardo combustion chambers. The six cylinders of 115 mm. bore and 142 mm. stroke are of the monobloc type in two groups of three each, having detachable hardened liners, which are inserted by a freezing process. Forced lubrication is provided, the valve gear being fed with oil at a lower pressure, which is bled by a patented device from the main oil pump.

The fuel oil pump and "pintle" injection nozzles are of C.A.V.-Bosch manufacture. Cooling water is circulated by a centrifugal pump driven at 1¼ times the engine speed, thus giving it a large capacity for its small size. The water pump shaft also drives the centrifugal governor, the high speed making it very powerful though it is very compact.

The electric starting equipment consists of a C.A.V.-Bosch 24-V motor driven by a battery in the usual automobile fashion. The battery is kept charged by a 400-W 24-V dynamo of the constant voltage type, which is driven in tandem with the water pump and governor.

The weight of the 85-h.p. 6-cylinder engine alone (without bedplate) is one ton. The welded-steel bedplate which carries the engine and both generators is of fairly deep section and is arranged for seating in the ship on two pads of vibration-absorbing material.

The fact that the new Diesel set proved itself to be relatively free from vibration and noise during the demonstration run at Southall last week, when it was merely standing on a level workshop floor without any hold-down bolts, indicates that the engines should be satisfactory in this respect when finally installed in the ferry boat.

Industrial Power

THE following is an analysis of the power in use in the textile, leather and clothing trades of Great Britain in 1930 and 1924 based upon the last Census of Production. The figures are thousands of horse-power :—

Trade.	Electric motors driven by purchased electricity.		Electric motors driven by electricity supplied from private plant.		Total electric motors.		Power applied mechanically.		Total power in use.		Power not supplied by electricity supply industry.	
	1930.	1924.	1930.	1924.	1930.	1924.	1930.	1924.	1930.	1924.	1930.	1924.
Cotton spinning	177.8	134.4	92.2	75.5	270.0	209.9	764.7	923.6	1,034.7	1,133.5	856.9	900.1
Cotton weaving	50.7	34.0	19.3	14.0	70.0	48.0	245.4	269.4	315.4	317.4	264.7	283.4
Woollen and worsted	88.9	67.8	86.5	60.0	175.4	127.8	266.0	297.8	441.4	425.6	352.5	357.8
Textile finishing	91.8	57.1	107.0	68.1	198.8	125.2	89.2	109.0	288.0	234.2	196.2	177.1
Silk and artificial silk ...	54.8	14.3	26.2	13.7	81.0	28.0	9.1	11.4	90.1	39.4	35.3	25.1
Hosiery	21.9	12.8	3.3	2.5	25.2	15.3	4.7	8.7	29.9	24.0	8.0	11.2
Linen and hemp	5.4	3.1	2.1	2.0	7.5	5.1	18.2	20.7	25.7	25.8	20.3	22.7
Lace	5.1	3.0	2.1	1.9	7.2	4.9	2.8	4.5	10.0	9.4	4.9	6.4
Jute	14.8	7.2	6.6	6.4	21.4	13.6	33.5	37.5	54.9	51.1	40.1	43.9
Rope, twine and net	12.7	8.4	1.6	3.4	14.3	11.8	12.3	10.8	26.6	22.6	13.9	14.2
Asbestos packing and goods ...	11.6	6.3	—	1.5	11.6	7.8	1.5	2.2	13.1	10.0	1.5	3.7
Flock and rag	7.4	5.1	0.8	0.5	8.2	5.6	6.7	5.8	14.9	11.4	7.5	6.3
*Miscellaneous	13.5	8.6	1.3	1.0	14.6	9.6	3.5	3.2	18.1	12.8	4.8	4.2
†Leather	39.6	31.5	15.9	11.4	55.5	42.9	14.7	18.9	70.2	61.8	30.6	30.3
Boot and shoe	32.1	24.6	3.0	3.0	35.1	27.6	12.2	19.3	47.3	46.9	15.2	22.3
Tailoring, dressmaking, etc. ...	30.6	23.9	1.7	1.5	32.3	25.4	3.3	4.7	35.6	30.1	5.0	6.2
Hat, glove, fur, umbrella, and walking stick	17.1	11.0	1.2	1.3	18.3	12.3	3.0	4.0	21.3	16.3	4.2	5.3
Totals	675.6	453.1	370.8	267.7	1,046.4	720.8	1,490.8	1,751.5	2,537.2	2,472.3	1,861.6	2,019.2

* Includes :—Canvas goods, sack, elastic webbing, coir fibre, horsehair, feather roofing, felts and packing.
† Includes :—Fellmongery, tanning and dressing of leather, manufacture of saddlery, harness and leather goods.

Battery Eliminators for Telephony. By D. M. Duinker*

THE direct feeding of telephone installations with rectified a.c., thus eliminating batteries, has long been aimed at.

A point in favour of the battery system is, of course, the continuation of the service in case of supply breakdown. But failure of supply is so rare nowadays, and, if occurring at all, is of so short a duration, that the battery eliminator for telephone work has become a proposition worth considering.

A rectifier for feeding a telephone system should have a d.c. output voltage as independent as possible of the load, and adequate smoothing circuits should be provided to prevent "hum" in the telephone receivers.

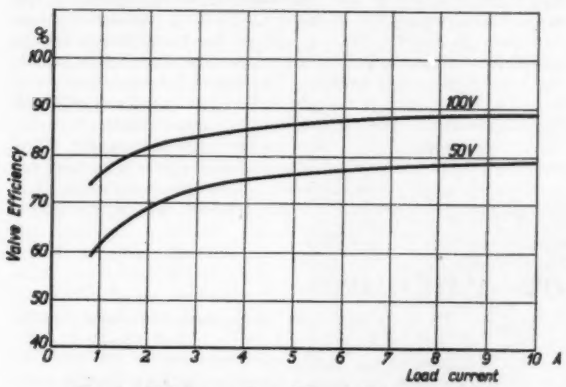


Fig. 1.—Efficiency of an "Oxode" rectifier valve

Of the various types available only the gasfilled valve rectifier possesses the property of having a voltage drop nearly independent of the load, so that chokes or other devices to compensate for the internal resistance of the rectifier system can entirely be avoided. The Philips "Oxode" rectifier tubes combine this useful property with long life. Fig. 1 shows the efficiency for different loads of the type 1788 full-wave 10-A tube at d.c. output voltages of 100 V (the maximum rated output) and 50 V (being the voltage used in the apparatus to be described below). In the latter case efficiencies as high as 76 and 79 per cent. are reached at half and full loads, respectively.

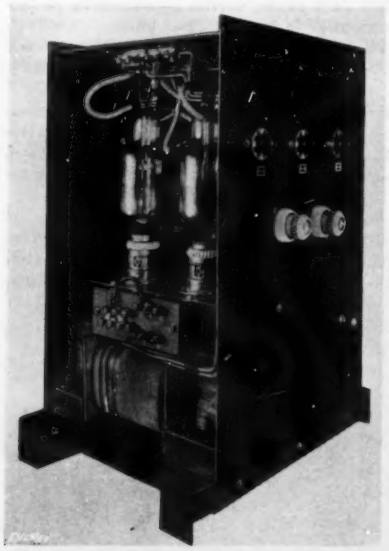


Fig. 2.—A battery eliminator with a 50-V, 7-A smoothed d.c. output for the direct feeding of telephone exchanges

The Smoothing Circuit

A single phase full-wave rectified voltage of 50 V d.c. contains a 100-cycle component of about 25 V r.m.s. This has to be reduced to something like 0.10 V to ensure perfectly silent operation of telephone receivers. The filter circuit for this purpose should possess a very low ohmic resistance, in order to keep the output voltage practically constant at different loads. A great help in designing a smoothing arrangement at a reasonable cost to fulfil these requirements is the availability of electrolytic condensers for working at up to about 450 V. Their use saves cost, space and weight, in comparison with paper condensers, and affords the possibility of designing filter circuits with relatively large capacities and small inductances (and correspondingly low resistance).

The rectifier illustrated incorporates the above mentioned features and is rated for a maximum output of 7 A at 50 V. The wiring diagram shows two pairs of output terminals, namely M taken from the third smoothing condenser intended to deliver a highly smoothed current of 1 A max. to the microphones, and R connected to the second condenser for supplying a less-smoothed current of 6 A max. for relay operations. This division of the loads allows the most economical filter system to be made, and it has the further advantage of protecting the sensitive transmission circuits from the strong pulsating relay currents, keeping the receivers perfectly free from clicks or rattling noises introduced by relay operation and dialling.

At small loads the output voltage of a rectifier containing a smoothing condenser tends to increase from the average of the rectified sine wave to the top. The resistance r (fig. 3), providing a constant minimum load, has been incorporated to avoid this. The current consumption of this resistance can be kept low by proper design of the circuit constants.

Valves in Parallel

The wiring diagram shows two full-wave rectifying valves connected in parallel. The striking voltage of these gasfilled tubes being slightly different for various samples (but always higher than the arc voltage), the one with the lower striking voltage will come into operation first, at the same time preventing the other one from igniting. In this way one of the valves acts as a spare and will automatically take the load should the other fail (British patent No. 412,471). The filament temperature of these tubes being only 950 deg. C., the cathode of the spare tube does not wear out at all, and consumes only about 20 W. Each valve has its own switch. Upon switching off the valve that is functioning, the other valve should ignite immediately, so that it is possible to examine each of the valves without any interruption of the output current.

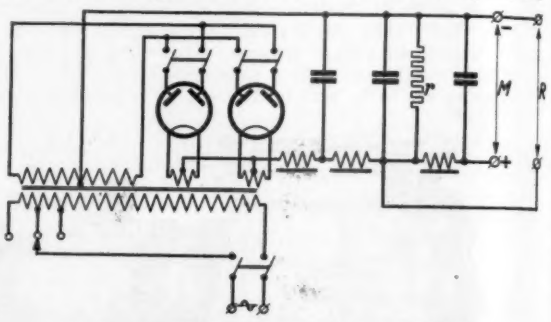


Fig. 3.—Wiring diagram of the eliminator

Service Performance

The apparatus is suitable for connecting to single-phase mains and is adjustable for five different supply voltages between 190 and 260 V (50 cycles). By means of separate taps on the primary side the d.c. voltage can be adjusted by ± 4 per cent. Fig. 4 shows the overall efficiencies and the d.c. output voltages for the three taps.

The following d.c. voltage limits are obtained for a load variation of 0.3-7 A, namely, first tap range 56-51 V, second tap 54-49 V, and third tap 52-47 V. These figures apply to the relay current terminals. The voltage across the completely smoothed circuit is, at 1 A, about 0.35 V lower than the above figures.

The unit gives absolutely humless operation on a normal private telephone exchange. In some cases it was even impossible to detect any hum with the transmission circuit connected across the terminals from which the relay current is usually tapped. Owing to the high efficiency of the valves, and the use of special condensers, the overall dimensions can be kept as small as 13 in. by 11 in. by 18 in., the net weight being about 178 lb.

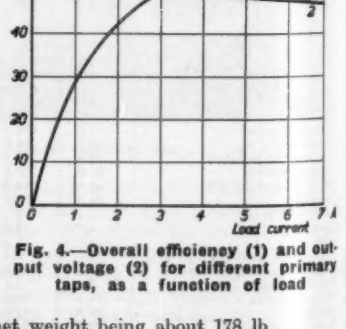


Fig. 4.—Overall efficiency (1) and output voltage (2) for different primary taps, as a function of load

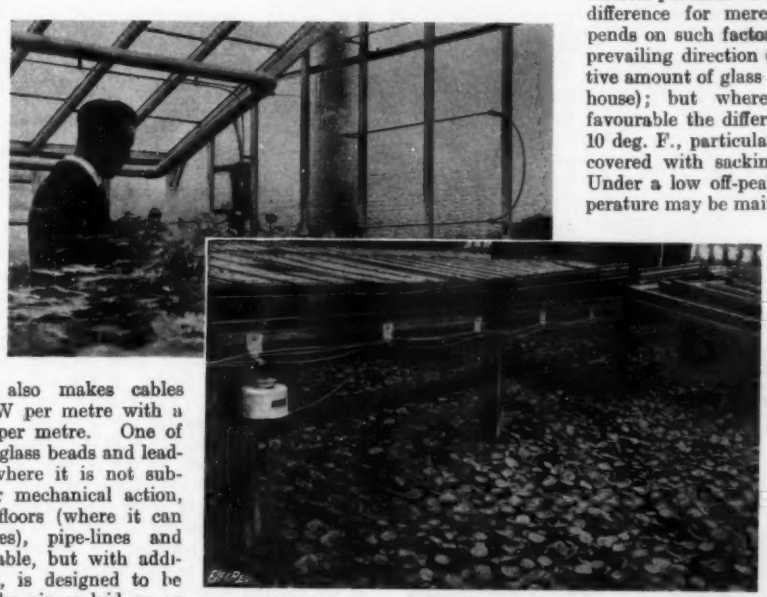
The 350-W rating of the illustrated unit is adequate for medium sized private exchanges, but is not by any means an upper limit. Rectifiers for direct telephone feeding, possessing all the above-mentioned advantages, can now economically be made for outputs up to several kilowatts.

*Philips' Lamp Works Laboratory, Eindhoven, Holland.

Greenhouse Heating by Electricity. By V. Sinclair

How various requirements are met

IN an article that appeared in the ELECTRICAL REVIEW of March 8th a survey was made of the methods of using soil-heating cables in various countries. There are, however, so many other applications for which these cables can be employed that on the Continent they are no longer designated as such by some makers, but actually as "heating cables," being manufactured in many types for various applications of heating. For instance, Siemens-Schuckertwerke offer three cables with a loading of 24 to 30 W per metre (according to the radiating capacity of the medium) and a resistance of 1 ohm per metre. The first is insulated with asbestos, impregnated and lead-covered, and is for use only where it is not subjected to chemical or mechanical action; being very flexible it can be employed for heating pipes by being wound round or drawn through them. The second is similar but is compounded over the lead sheathing; it is employed chiefly for soil-heating. The third has an additional iron sheathing; being more rigid it is suitable for heating rooms where it is suspended freely in the air. The same concern also makes cables loaded at 80 to 200 W per metre with a resistance of 1 ohm per metre. One of these, insulated with glass beads and lead-covered, is for use where it is not subjected to chemical or mechanical action, such as for heating floors (where it can be drawn into pipes), pipe-lines and gutters. A similar cable, but with additional iron sheathing, is designed to be suspended freely in the air or laid on or in the walls and is specially suitable for damp situations such as greenhouses. In another type insulated with glass beads, copper sheathing takes the place of the lead covering; this type is suitable for dry rooms only, *e.g.*, for running inside walls and for forming into heating-frames for large windows. The high loading types are also made with a resistance of 0.25 ohm per metre for heating large objects with greater lengths of cable.



Left: Corner of a hot-house with supplementary electrical air-heating by Siemens-Schuckert cables run on small brackets screwed to the window frames and roof principals. Right: A cyclamen bed at the nurseries of N. V. Heringa & Wuthrich Mij, Haarlem, showing thermostat for soil-heating cables and also air-heating cables above. *(By courtesy of Elektrizitäts-wirtschaft.)*

The air-heating of greenhouses and frames with or without soil-heating cables is becoming increasingly popular with amateurs in this country. On the other hand, electrical air-heating has not been adopted by our commercial nurseries to anything like the same extent as on the Continent. The reason is that the amateur does not grow for profit, so that he is not so much concerned with economics as with convenience, saving in labour and avoidance of the trouble given by fuel-consuming devices in small greenhouses. The commercial grower has, until recently, been handicapped by foreign competition, which did not encourage further capital outlay.

In the case of hot-houses the system has not been found economical, even with the lowest tariffs available, where a temperature of 70 deg. F. may have to be maintained. The reason for this is that whereas heat generated in the soil by means of soil-heating cables is stored up for many hours and may, therefore, be economical, heat generated in the air only is rapidly dissipated, especially where there is much glass. Hence, as a general rule, for horticultural purposes the system is restricted to so-called cold houses, or to frames where it is used according to the nature of the plants, just as a frost-preventer by itself, or as a supplementary form of heating with soil-heating cables, hot water or manure. For amateurs hot water and manure need not be considered; if it be required to heat the soil at all, this should be done with soil-heating cables, and manure is increasingly difficult to obtain at a reasonable price, apart from its other inconveniences.

Calculating the Loading Required

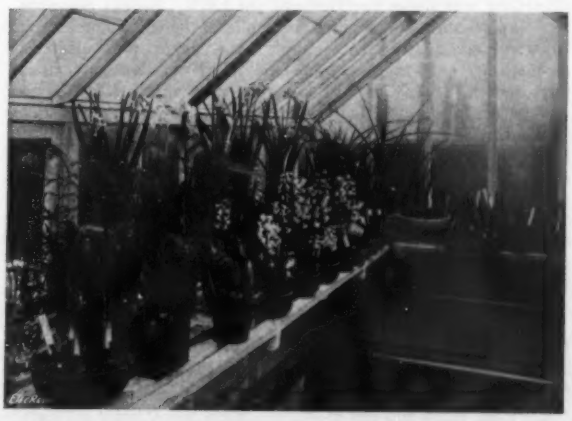
The first principle which the amateur should realise in equipping his own cold-house with air-heating is that the radiating area should be the basis of calculation, not the cubic contents. The radiating surfaces of the greenhouse may consist of materials varying greatly in respect of heat transfer.

The following formula is used on the Continent to calculate the loading required:—$C = S \times h\ (t_i - t_e)$, where C=calories per hour required, S=total surface of house, h=heat transfer coefficient per m² per deg. C. in calories, t_i=internal temperature required, and t_e=external temperature anticipated.

The coefficient h is approximately 5 for glass, 3.5 for double glazing, 2 for brickwork about 8 in. thick, 1 for double matchboarding with tarred felt, and 1.5 for uninsulated soil.

To obtain a precise result a separate calculation should be made for each kind of surface. The sum of the calories thus obtained gives the required loading from the formula: 860 calories per hour=1 kW. The temperature difference for mere frost prevention depends on such factors as situation, aspect, prevailing direction of wind, and the relative amount of glass (if lean-to or span-roof house); but where the conditions are favourable the difference may be taken as 10 deg. F., particularly if the glass can be covered with sacking on frosty nights. Under a low off-peak tariff a higher temperature may be maintained for the growth of sensitive plants. Having established the loading required, we can adopt any one of three air-heating systems on the electrical market.

The first means to consider, as it involves the least trouble in erection, is heating cable, the lead sheathing of which should have ample protection against corrosion. As the smallest greenhouse would probably require a loading of 750 to 1,000 W (allowing for a suitable margin), we need take into account only standard lengths of cable having loadings of 500 or 700 W, running two or more circuits in parallel according to the amount of heat required for the sum of the radiating surfaces. The cables may be hung by leather or other suspenders from galvanised-iron wires stretched from end to end of the house, or run through



The interior, in December, of a greenhouse heated by means of an electric boiler (H. Church & Co. (Essex), Ltd.), showing the circulating pipes and expansion chambers

long screw-eyes in the roof principals or window frames not too near the glass. For frames, with or without soil-heating, short standard lengths (with loadings of, say, 200 W) may be run round the sides under saddles to give such supplementary or exclusive air-heating as may be required by the sensitiveness of the growths to sudden temperature variations.

Next comes electrical air-heating by means of tubular heaters containing resistance wires, which are generally fixed under the benches against the wall or on the floor. These are made in many loadings and lengths, or arranged in banks, to suit any type of greenhouse. Tubular-heater installations are slightly more expensive than those employing heating cables, but make a neat and solid job.

Small electric boilers containing immersion heaters, a pipe-circulating system and expansion chambers are available for loadings of 500, 1,000 and 2,000 W. While these installations are more expensive than either of the foregoing, they possess the advantage that the heating elements are concentrated at one point, where they are accessible for variation and renewal.

Automatic control by thermostat is worth the small extra initial outlay as it provides a reliable safeguard against unexpected night frosts. The cost of running an electrical air-heating installation in a cold-house of average size (say, from 70 to 100 sq. ft. of floor area) may vary from 4 to 8 kWh per day, depending on the factors already mentioned and the nature of the plants grown, *i.e.*, the temperature to be maintained. An average cost of from 3d. to 6d. per day compares favourably with good fuel-consuming systems when all the other advantages are considered, including initial cost. These systems cannot be automatically controlled, and growers are often obliged to keep them running continuously in such weather as we had in May, just to allow for out-of-season night frosts. In addition small greenhouses thus equipped, unless the ventilation is strictly attended to, frequently become overheated and suffer from fumes and pests.

Electrical air-heating of a small greenhouse by means of G.E.C. "Magnet" tubular heaters

It was established in Germany and elsewhere on the Continent, at least five years ago, that electrical air-heating could not be used commercially for hot-houses unless the price of electricity was about one farthing per kWh. Recent comparative experiments undertaken in Holland (with manure only, electrical soil-heating cables only, the latter plus electrical air-heating, and manure plus electrical soil-heating cables) have shown, at any rate in so far as cucumbers, strawberries and lettuce are concerned, that even supplementary electrical air-heating is unprofitable under Dutch tariff conditions. The best results for these plants were obtained with horse manure combined with supplementary soil-heating cables. Summarised results indicate that exclusively electrical air-heating of greenhouses is profitable only for very choice and expensive flowering plants which are particularly sensitive to fluctuations of temperature. On the other hand, it is recommended as a supplementary source of heat to deal with sudden snaps of frost.

In Germany, where experience has been greater and more thorough, the question of electrical soil or air-heating is now answered somewhat differently. While they agree with Dutch conclusions with regard to cucumbers and other plants that require an extra amount of bottom heat, the general tendency with large commercial frames is to use a light filling of manure combined with electrical air-heating. The latter protects plants from the penetration of cold air from the glass surfaces and enables the manure to retain its heat; it is cheaper to install than soil-heating cable. The tendency is also to dispense with the heat insulation of frames (beds of coke, &c., under the cultivation soil and round the frames) which has been found by no means so effective as was at first supposed.

The value of supplementary air-heating in greenhouses is not considered so much from the point of view of neutralising the effects of sudden frosts as of heating hot-houses during transition periods, before it is worth while to start up the boiler plant. Many flowering plants, such as cyclamens, begonias, and so forth, lose their good appearance if moisture is deposited on the blooms during cool nights, such as frequently occur during September and October when general heating is not yet required. This deposit can be prevented by a very small expenditure of heat.

German Practice

Generally speaking, recent German practice has adopted the following principles for electrical heating:—

Soil-heating *per se* is only useful for forcing beds and for beds used for shoots and for propagating on the benches of greenhouses already provided with air-heating and where the temperature of the soil must be kept as constant as possible in order to accelerate the rooting of shoots or the germination of seeds.

Electrical soil-heating combined with electrical air-heating is recommended for beds where it is intended to set pot plants temporarily to tide over a cold season. The soil-heating cable serves principally to pre-warm the soil if the bed has not been used during winter.

Air-heating alone, even without a filling of manure in the beds, may be applied in cases where it is required to cultivate hardy pot plants in the frames, or where the latter are merely used as winter quarters for such plants; also for beds intended only for cultivation later in the season when only occasional night frosts may be anticipated. In such cases the soil should be covered during the winter with leaves, manure or the like, so that it is not too cold when put into use.

A filling of manure (4 in. to 6 in. is quite sufficient) is the right thing for early vegetable beds, but its self-contained heat does not outlast a cultivation period. This is where the function of electrical air-heating finds its place, since it warms up the air in the soil in so far as the cold from the glass cannot cool down the bed. The shallow layer of manure is thus able to retain its heat for the whole period.

Experience has shown that electrically heated frames of the ordinary kind absorb, on the average, about 1 kWh per m^2 per day to maintain an over-temperature of 20 deg. C. in the bed, so that it is advisable, when heating can be applied for twenty-four hours, to wire for a loading of about 50 W per m^2, it being immaterial whether air heating, soil heating or both are employed. If mixed heating is applied about two-thirds of the loading should be used for air-heating and one-third for soil-heating. Storage of heat in the soil overnight is only worth while when the difference between day and night tariffs is very marked. It is generally more economical during very cold periods to heat with high-tariff day-time energy, thereby saving the more expensive initial cost entailed by high loading in the soil necessary for night storage. In the case of air-heating, heat storage is impossible, so that current must also be used during daylight hours, but experience has shown that the principal demand takes place at night.

Small Consumption

One can manage with quite a small consumption of current if ordinary care is taken. For instance, during the severe frost of November, 1933, on the Continent it was found possible in a certain nursery to protect several beds, each 50 m^2, from frost by means of electrical air heating with a loading of only 1 kW per bed, *i.e.*, 20 W per m^2 per hour, while thousands of plants in nearby nurseries perished during the night.

Generally speaking, the advantages of electrical heating in horticulture cannot be estimated from figures alone. Given a reasonable tariff and ordinary intelligence it provides safeguards which can hardly be set at too high a value. It is always ready to apply, independently of season and weather; it has great elasticity when used in conjunction with manure, and can be easily adapted to market conditions. Moreover, whatever the doubt in regard to additional yield compared with a carefully tended manure bed of the usual kind under ordinary conditions, this disappears immediately the weather becomes cold and the manure bed is unable to rise to the occasion if insufficient manure is available just when required, if the quality is deficient, if diseases are introduced, and so forth.

Such eventualities retard the plants in ordinary beds, whereas the growth in electrically heated beds is not interfered with. No early winter can take unawares a bed equipped with electrical air-heating. The commercial grower should be induced to heat his beds electrically, not so much from the point of view of increased yields as from that of being able to safeguard them.

I am indebted for assistance received in the preparation of this article to the General Electric Co., Ltd., Messrs. H. Church & Co. (Essex), Ltd., the publishers of *Elektrizitätswirtschaft*, Siemens-Schuckertwerke, and, for information regarding modern Continental practice, to Mr. W. Kind of the last-mentioned company.

Mining Electrical Engineers

Annual Convention

THE annual convention of the Association of Mining Electrical Engineers at Nottingham from Wednesday to Saturday last week commenced with a reunion of members and their friends, the delegates being accorded a civic reception by the Lord Mayor. While the Victoria Hotel served as the headquarters, the meetings in connection with the convention were held in the imposing University College, opened by H.M. the King in 1928, the annual dinner of the Association being held in the College refectory, followed by dancing, the attendance numbering 250.

A full programme of tours of factories was arranged, one being to the Stanton Coal and Iron Company's works, a feature of which is the plant installed for the centrifugal casting of pipes in iron, steel, and cement. An alternative visit was to the factory of Ericsson Telephones, Ltd., at Beeston. While members attended the convention their ladies had an opportunity of visiting the modern works of Boots (Cash Chemists), Ltd., which were described in the ELECTRICAL REVIEW some time ago.

A party of about 100 travelled to Rugby on Friday to tour the works of the British Thomson-Houston Co., Ltd., which entertained the visitors at luncheon and tea. Apart from a demonstration-lecture on research, with particular reference to electric lighting, a specially arranged exhibition of mining equipment included heavy duty slip-ring motors for haulages; general purpose mining motors for surface and for underground installation; oil immersed h.v. contactor and drum controllers with unbreakable resistances (flameproof and non-flameproof for underground and surface haulages); hand-operated and contactor-type air-break and oil-immersed starting and control gear; flameproof motors, gate-end boxes and small lighting transformers for coal face use in mechanised mining; iron-clad draw-out switchgear for mining and general industrial service; and a portable mining sub-station comprising a small dimension transformer with circuit-breakers, arranged to be self-contained for movement from place to place.

Among winder equipments seen in course of manufacture were two Ward Leonard sets for Van Dyk Consolidated Mines, Ltd.; a Ward Leonard Ilgner winder for New Zealand; and three further winders for the East Rand Proprietary Mines.

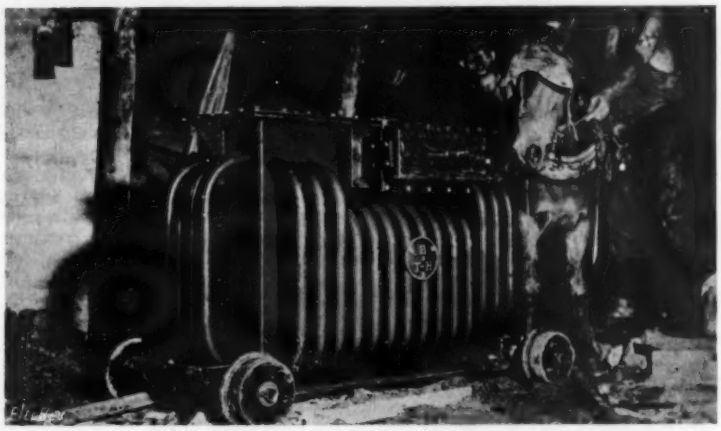
A number of mercury arc rectifiers under construction were also inspected. These form part of an order for twenty for the electrification of the South African Railways received from the Electricity Supply Commission through Messrs. Wilson and Herd, Ltd., this being the largest single contract ever placed for mercury arc rectifiers for inverted operation by means of grid control, which will also be used to maintain the sub-station voltage constant under varying load conditions.

Large Generators

In the turbine factory several large machines were seen in various stages of assembly. They included the steam end of a 50,000-kW turbo-alternator for the Ironbridge generating station of the West Midlands Joint Electricity Authority. The alternator will generate at 33,000 V and the stator is being wound on site. Another machine also being manufactured for generation at 33,000 V is the 50,000-kW turbo-alternator for the Lancashire Electric Power Company's Kearsley station. Various parts of a 30,000-kW turbo-alternator for Messrs. Balfour, Beatty & Co., Ltd., for installation in the Spondon station of the Derby and Notts Electric Power Co., were also inspected.

One of two coke oven gas exhausters ordered by Messrs. Woodall, Duckham, Ltd., for the United Steel Corporation, and large contactor panels for the control of electric drives for coal washery plants and sectional paper machine drives, besides standard products and two sets of h.v. a.c. air-break reversing contactors for electric winder service, were other items of interest.

An alternative to the Rugby trip was a drive through "The Dukeries," including Welbeck Abbey. The day's outings concluded with a dinner at the Victoria Hotel, given by the various coalowners' associations in the district. The chair was taken by Capt. P. Muschamp (representing the Midland Counties Colliery Owners' Association), who was supported by Mr. James Seely and Sir H. Dennis Readett-Bayley (also of the Midland Association), and Mr. F. M. Joyce (South Derbyshire Association). The toast of "The Association of Mining Electrical Engineers" was proposed by Mr. Seely, who referred to the great strides made by the electrical industry in mining during the last few years. Mr. Frank Anslow, past president of the A.M.E.E., responded in the absence owing to illness of the president, Mr. H. J. Fisher. Mr. J. R. Cowie, in proposing "The Coalowners' Associations," spoke of the Midlands as leading the way in coal cutting, and more particularly in coal conveying apparatus. Capt. P. Muschamp, responding, said it was unfortunate that when the grid was established collieries were not permitted to supply electricity, which they could and would have supplied at a very low rate. He expressed the view that, in our time at any rate, the public would not get cheap electricity from the grid owing to the piling up of capital to pay interest on loans.



A B.T.H. mining type transformer being installed in a colliery

The Presidential Address

At the annual meeting of the Association the membership was shown to be 2,062. Mr. A. W. Williams was elected president and Mr. J. R. Cowie vice-president.

In his presidential address Mr Williams, without suggesting that the mining industry was inefficient, stated that they must never be content with their present degree of efficiency. A great deal of thought was now given to standardisation. Practically every commodity used in connection with electrical apparatus was either standardised in some form or other, or was under consideration from that point of view. While one might be in general agreement with the advantages of standardisation in many positions, he feared there was a great tendency to overstep the mark of strict utility, and with this in mind he was bound to express the opinion that it would retard efforts towards further research. The necessity for scientific departments would cease if standardisation was forced too much upon an industry, and thus a check would be placed upon individual initiative and investigation, with resultant retardation of industrial progress.

Reliability and efficiency, he said, were factors of great importance in mining safety, but there had been a tendency to introduce automatic features popularly known as remote control in electrical equipment at the coal face. It could not be said that all these devices were suitable for these positions. They lacked reliability and, from the mining engineers' standpoint, offered no compensating advantages in the form of greater efficiency of coal production; they made for safety in one direction but added many dangers in another.

At the Association's annual dinner the principal guest, Captain H. F. C. Crookshank, Secretary for Mines, remarked that in 1909 when the Association was formed the h.p. used in the mining industry was 200,000, whereas to-day it was five times that amount. The introduction of new lighting regulations had brought a considerable amount of fresh work, but he was somewhat disappointed to find from reports from different parts of the country how little had been done so far in the way of improved lighting. He hoped, however, for further progress in this direction.

On Saturday morning some seventy members proceeded to the Mines Research Station at Harpur Hill, near Buxton, where they were permitted to see a coal-dust explosion and to inspect the various apparatus and testing appliances instituted by the Mines Research Board for the protection of workers in the industry. After luncheon a lecture was given by Dr. Allsop.

Domestic Hot Water. By H. Smith

THE sale of domestic appliances is steadily and surely increasing; the process, however, is painfully slow and a special united effort by supply companies and manufacturers would help us to meet the public's exacting needs.

Can it be said that the increase in the demand for electricity is due to new consumers or to the old consumers using more? The probability is that in most households electricity is only used where it is most convenient, and in these cases efforts should be made to find out why the consumption is not greater.

Most households get into a definite routine of doing everyday things. For example, hot water is produced in a variety of ways all of which are convenient to particular households. It may be that there is only a gas cooker in the kitchen and a gas geyser in the bathroom, both of which provide ready means of obtaining hot water. The gas geyser will give any number of baths one after the other. Is there any satisfactory electrical method which will give the same results? One is urgently required, say for the sporting type of family the members of which all come home in the evening after their games, demanding baths. When the problem of multiple baths does not exist what is the best suggestion to make?

Before any proposals are made it is necessary to find out what form of heating the particular household has been using. If there is a hot water system with a separate boiler and a storage tank in an airing cupboard it is very difficult to show that an electric storage heater would be cheaper and better.

In most modern houses it is not easy to find a place for the heater unless the old system is removed. This is considered too expensive and an immersion heater is suggested. Here, again, the prospective consumer is not impressed; he knows a number of people who have had immersion heaters fitted but are not getting very satisfactory results, the time taken to get hot water being far too long. Inquiry shows that a 0.75 kW heater has been inserted in a 30-gal. tank. Obviously it is not possible to get the same results as from a coal or coke-fired boiler, hence the dissatisfaction.

The importance of studying the individual needs of each household cannot be overstressed, and when discussing with a prospective consumer the different methods of water heating the full facts should be disclosed. There is nothing to be gained from telling him that all he wants is a 0.75 kW immersion heater without explaining that it can only be used as a booster to his existing system, and that if used alone it takes hours to produce really hot water.

How often do we meet the man who says: "If you can produce something that will give me hot water as quickly as a gas geyser I'll have it," or "Have you anything which will give me hot water like my present coke-fired boiler and which will not mean any structural alterations?"

The other problem of hot water in the average household is its rapid supply for tea-making and cooking purposes. Most people are chary of using water from a heater for these operations and it is difficult to collect favourable reports from owners of quick boiling rings and electric kettles. It is not that they do not give results, but invariably there are not enough rings to give the quantity required. The reason for this is that the consumer has perhaps been in the habit of using a gas stove with at least four boiling rings.

If any household is used to methods that do not require such a supply of hot water for cooking purposes it is possible to convince the consumer that electricity is best, but other cooking considerations very often give gas the preference.

A housewife who has been used to cooking with a thermostatically controlled gas oven would require exactly the same thing from electricity. The control should be marked in the same way and operate in a similar manner, otherwise she will display very little interest. Anything different means that she has to learn to cook all over again. Demonstrators can show what can be done with an electric cooker, but housewives say that they have been trained in the art of using electricity as well as the art of cooking and are quite sure that if the demonstrator was suddenly confronted with a gas cooker she would not get the same satisfactory results. To get down to the problem the salesman must study the individual requirements of the public and the manufacturer, and follow up his conclusions with suitable appliances.

Measuring Vacuum Cleaner Suction. By J. Southworth

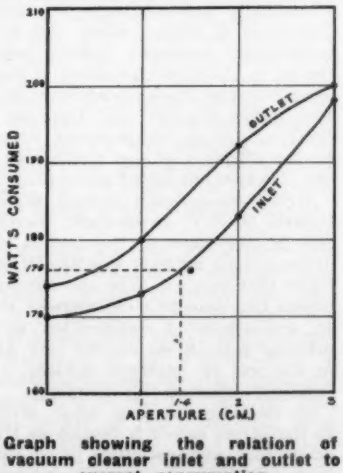
THE two recognised methods of testing the suction of a vacuum cleaner are based respectively on water suction and air displacement. The significance of these tests is very imperfectly understood.

The water suction test, which measures the degree of vacuum, is the easiest to apply and standardise, since it simply represents the height to which the cleaner will suck up water in a tube. The bore of the tube is immaterial, so long as it is not too fine. In practice a U-shaped glass tube, open at both ends and known as a water gauge, is employed. This is about half filled with water and, on connecting the entrance nozzle or inlet of the vacuum cleaner to one end of the tube, the water rises in one leg of the gauge and falls in the other. The difference between the heights of the two columns of water gives the water suction in inches or other units. Occasionally mercury instead of water is used; one inch of mercury is equal to about 13½ in. of water.

The air displacement, or air-flow, is the volume of air passing through an aperture when the machine is at work. It is sometimes called the volumetric speed. In this country it is generally given in cubic feet per minute. It cannot be determined by the user unless he has some form of air-flow meter.

A Complication

What greatly complicates the question of testing is the fact that there is no necessary relationship between the water suction and the air displacement of cleaners in general. Thus, machines of the runabout type, fitted with a single fan (apart from that which may be used to cool the motor), have usually a rather low water suction together with a relatively high displacement. On the other hand, cleaners of the cylinder type, having frequently two or more fans in stages, one behind the other, forming a multi-stage fan, have usually a high water suction together with a relatively low displacement. Thus the water suction is no guide to the air displacement and vice versa.



Graph showing the relation of vacuum cleaner inlet and outlet to current consumption

The figures in table I are interesting in this connection. They all relate to different-sized models of the same make of cleaner (a multi-stage fan type). The data are those given by the makers themselves in their own publications and hence should be strictly comparable.

Table I.

Model.	Water Suction.	Displacement.
A1	24 ins.	24.7 cu. ft.
A2	33 ins.	35.3 cu. ft.
A3	28 ins.	63.0 cu. ft.
A4	30 ins.	115.0 cu. ft.

That the cleaner with the highest water suction should not have the highest displacement is not surprising when one considers the conditions of the two tests. In the water suction test the entrance nozzle, or inlet, of the cleaner is completely sealed up by the column of water; when the latter has reached its maximum height the displacement, or air-flow, is nil. In other words, the water test, in effect, measures the suction (using the term to cover both the degree of vacuum and the air displacement) with a completely closed nozzle. On the other hand, the air displacement measures the suction with a completely open nozzle. Hence there is no necessary relationship between the results of the two tests, as already stated.

A New Test Suggested

The conditions of these tests do not correspond exactly with those usually occurring in practice. In use, the entrance nozzle of a vacuum cleaner is rarely either completely closed or completely open (even when the nozzle is pressed down upon a carpet a certain amount of air is sucked in through the carpet pile). In these circumstances what one most requires to know as a guide to the behaviour of a machine regarded purely as a suction cleaner, is the suction with a partially restricted opening. Can one say what should be the size of such an opening? The answer is in the affirmative.

In experimenting with a certain vacuum cleaner, fitted with a single-stage fan, I made the surprising discovery that when either the inlet or the outlet was made smaller (by placing thin cardboard discs with circular apertures cut in them over the inlet and outlet respectively) the watts consumed by the motor decreased (see table II and the accompanying graph). In fact, when both the inlet and the outlet were completely

Electricity in a Youth Hostel

THE increased popularity of cycling and hiking has been responsible for the growth in the membership of the Youth Hostels Association to 50,000 in the past five years, and there are now 250 hostels available. Up to the present, existing buildings have been converted and utilised, but the Association has just realised an old ambition and has opened a model hostel, incorporating a number of ideas obtained from experience.

At this new hostel, which Mr. Howard V. Lobb has designed, at Holmbury Hill, not far from Dorking, Surrey, members obtain for a shilling a night accommodation which, in spite of the restricted funds available, might almost be said to be luxurious for it compares very favourably with many country hotels.

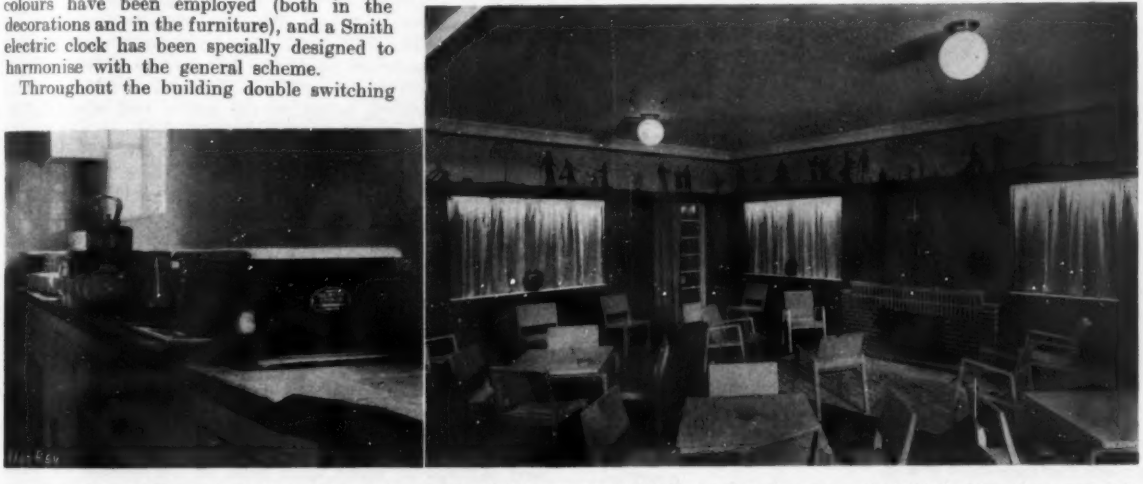
The rear of the Holmbury Youth Hostel, near Dorking, Surrey

Though economical, the electrical equipment is well up to the high standard of the rest of the building. In the walnut-panelled common room, a portion of which can be curtained off as a dining recess, no fewer than four systems of illumination are employed. The main lighting comes from two central spherical pendants, while the dining tables are lighted by two circular fittings, with a special wall-bracket in one corner. Above each of the window-frames have been placed four concealed tubular fittings which give a singularly warm and comfortable effect when the curtains are drawn. In this room, as well as elsewhere in the building, bright colours have been employed (both in the decorations and in the furniture), and a Smith electric clock has been specially designed to harmonise with the general scheme.

Throughout the building double switching has been employed extensively for the lighting, and in both of the dormitories there are in addition to separate switches for the three spherical fittings, master switches for the use of the warden. In the lavatories "Lacent" totally enclosed lighting fittings are employed.

Meals can be obtained from the warden, but for those who wish to prepare their own, a special kitchen has been provided in which, at the cost of a penny, members may have the use of one of six 2-kW "Efesca Servis" cookers. These little cookers, which together with the rest of the electrical equipment were supplied by Messrs. Falk Stadelmann & Co., Ltd., are installed, three on each side of the kitchen, on vitreous tiles to prevent damage by heat. The 15-A "M.K." switch-sockets from which the power is derived, are fitted with adaptors so that electric kettles, of which four 3-pint models have been provided, may also be used. In the separate warden's kitchen, there is an additional cooker of the same type, and points for a refrigerator and a potato peeler.

In all, the electrical installation amounts to about 18 kW, the supply coming at 230 V by underground mains from the London & Home Counties J.E.A.'s overhead l.p. lines which run along the edge of the grounds. The installation was carried out by Messrs. B. G. Suthers, Ltd., Guildford, who have employed Callender lead-covered cable, "Prento" and "Radette" ironclad switchgear for the power and lighting circuits respectively, and Chamberlain & Hookham meters. Crabtree inset switches and "Osram" lamps are used throughout the building.



Three of the "Efesca Servis" cookers in the members' kitchen, and (right) the common room at night showing the concealed lighting above the windows

Measuring Vacuum Cleaner Suction

(Continued from preceding page)

closed the current consumption was still quite low, although not the minimum.

Table II.—200 V, 50 cycles, a.c.

Varying inlet (constant outlet = 4.8 c.m.) with dust bag attached.

Inlet diameter ...	5.1	3	2	1.5	1	0	c.m.
Consumption ...	202	198	183	176	173	170	watts.

Varying outlet (constant inlet = 5.1 c.m.) without dust bag.

Outlet diameter	5.3	3	2	1	0	c.m.
Consumption	209	200	192	180	174	watts.

No inlet or outlet, consumption 175 watts.

Whether this curious behaviour is due to pneumatic or to electrical laws, or to a combination of both, I am not prepared to state. Nor can I say whether other cleaners would behave similarly. There is no apparent reason for assuming that there would be any difference, however.

With this cleaner, when using either the carpet nozzle on an average carpet or an upholstery nozzle on upholstery, the current consumption is about the same, namely, 176 W. On comparing this with the inlet curve on the graph, it will be seen that this figure corresponds to the current consumption with an inlet aperture of 1.4 cm. Hence one concludes that the suction of any vacuum cleaner will be best measured by the air-flow or air displacement through an inlet aperture of 1.5 cm. diameter or less, the bag or other dust-filtering arrangement being in position (the removal of the bag, of course, will increase both the air displacement and the water suction.

Some cleaners, however, do not depend upon suction alone; they have a revolving motor-driven brush in the nozzle. Since such cleaners probably operate less closely to the carpet than others, in their case a larger test aperture than 1.5 cm. might be thought desirable. What is most required, however, is an index to the behaviour of a machine regarded purely as a suction cleaner, and for this the smaller test aperture is preferable, as already shown.

The air-flow through an aperture of 1.5 cm. will also doubtless afford a reliable indication as to the efficiency of a cleaner for domestic blowing purposes, since this is just the inside diameter of some blowing nozzles.

The I.E.E. Wiring Regulations. By E. W. C. Day

Criticisms and suggestions

THE title of the code now generally known as the I.E.E. Wiring Regulations has undergone many changes in its ten editions.

The first edition was issued in 1882 specifically for purposes of large insurance, under the rather guarded heading of "Rules and Regulations for the Prevention of Fire Risks Arising from Electric Lighting." Seventeen years later this title was changed to read "General Rules Recommended for Wiring for the Supply of Electrical Energy," and could be regarded as a gentle "feeler" to see how they were received in the supply industry as a whole. In 1907 the urgent need for uniformity in wiring methods was fully recognised and a fifth edition was published, briefly and comprehensively entitled "Wiring Rules," while after the war the expansion of the application of electricity necessitated an entire revision, and a comprehensive work was published under the title of "Regulations for the Electrical Equipment of Buildings."

Not Legally Recognised

It is significant that even in 1935, fifty-three years after the publication of the first edition, only *one* supply authority out of over six hundred in Great Britain has the legal power to enforce such Regulations within its statutory area of supply.

The Electricity Commissioners issued their revised Regulations during 1934; these cover works put into commission after January 1st, 1935, but, although the expression "Compliance with the provisions of the Regulations for the electrical equipment of buildings issued by the I.E.E. and for the time being current shall be deemed to fulfil the requirements of this Regulation" appears in several instances, it is not the Commissioners' policy to enforce in their entirety the present edition of the I.E.E. Wiring Regulations. Incidentally, I understand, it is doubtful whether the Commissioners' Regulations, 1934, would be upheld in the Courts if they exceeded or were in any respect contrary to existing clauses contained in the Acts or Orders under which the various authorities received their present Parliamentary powers.

Mr. E. W. C. Day

In mitigation of these circumstances it has been argued that it is the business of architects and surveyors to insist that no wiring shall be installed in buildings under their control which does not comply with the current I.E.E. Regulations. Admitting the accuracy of this view, it is deplorable that the electrical industry is not in a legal position to regularise its own activities. Cannot the supply authorities or some representative and responsible body be authorised to make application to Parliament for powers to enforce a code of regulations that may be deemed necessary for the safe conduct of the industry as a whole?

The Phrasing

Irrespective of whether in future years the I.E.E. Regulations will become legally enforceable, the average supply engineer and contractor is faced with a second problem in the difficulty of understanding many of the Regulations, due to their mixed legal and technical phraseology. For example, my "book" happening to open at page 73 Rule 1001 may conveniently be used as an indication of the hard study that is necessary to enable the average intelligence completely to assimilate the Regulations in order to issue lucid instructions to wiremen.

This cannot be regarded as a freak opinion, as the Association of Supervising Electrical Engineers has found it necessary to compile a précis for issue to its members. Was it really necessary in the current publication to fog the already none-too-clear wording by formulating rules in such a manner that an actual study of the phrasing became essential for a proper understanding? Would it not have been better for all concerned to have used simple phrases which could be instantly comprehended?

In certain instances requirements have been stated tentatively where plain speaking would have been appreciated by those concerned in their practical application. For example, No. 1337 (A) is that "The support and frame of every heating and cooking appliance shall be provided with a suitable terminal to which the earth continuity conductor may be connected." One wonders how many portable radiators being sold in supply authorities' showrooms are provided with an earth terminal. Further, it is apparently optional whether the terminal (if provided) need be connected to earth. Has not the time now arrived for a definite statement to the effect that portable and fixed apparatus with conducting framework must be provided with an earth terminal, and, further, that the apparatus concerned must be earthed? Surely the old question "To earth or not to earth" has had time enough to die a natural death. Is it fully appreciated that uniformity must be achieved in time to save the rules from becoming a matter of jocular reference?

Suggested Amendments

Much material for reflection has appeared from time to time in these columns, although only in a few instances has the trend of the article been to thin out existing rules. More often than not if contributors' suggestions had been accepted an increase in the number of Regulations would have resulted without material improvement. It should be borne in mind that the continual pruning of the rose tree improves and strengthens the plant as a whole if done in the correct manner.

If it be accepted that many existing exceptions have to be fully considered and due allowance made when rules are formulated, then surely it is time for existing operations to be carefully reinvestigated for the purpose of eliminating undesirable methods. Such investigations should naturally result in increased safety to the public and especially to children.

Many "family" engineers will question the advisability of continuing to install s.p. switch-plugs at floor level. In the first place, safety depends on the switch being connected in the live conductor. We are faced with two alternatives to remove the obvious dangers of such situations; either the switch should be designed to operate both poles or the switch-plug should be replaced by a simple plug of the shielded-contact pattern.

Closely bound up with this is the question of earthing, and I feel strongly that there should be no doubt regarding the advisability of attaching earth leads to the conducting framework of all portable and fixed appliances. I would also suggest that in average domestic conditions the use of a switch-plug is not imperative and that it could conveniently be replaced by a semi-rotating shielded-contact three-pin plug, many excellent patterns of which have been on the market for some years. If this arrangement were accepted by manufacturers as a body I am convinced that the chief source of danger to the public would automatically cease to exist.

The chief remaining cause of danger, viz., fire due to electric irons, could be easily dealt with by providing pilot lamps or some automatic indication of when they are in circuit. Manufacturers could agree to cease supplying irons and bowl fires with lamp adaptors, a practice which greatly encourages the use of such apparatus from the lighting circuits, where protective arrangements are unsuitable. Incidentally, the Regulation regarding earthing of tumbler-switch metal covers and metal lampholders situated in dangerous places would become obsolete if they were universally displaced by those of a bakelite pattern.

Means of Enforcement

In conclusion, I would propose that an administrative body representing the supply industry should be formed to obtain the necessary legislation to enforce universal adoption of the I.E.E. Regulations, after modification. Should this course be over-ruled, then I would suggest that manufacturers should form a confederation in order to prevent the supply (now that tariffs are established) of apparatus to the market in such a condition that it is likely to become dangerous to the buyer, *e.g.*, metallic hairdressing appliances without earthing leads.

The second alternative does not cope with existing installations, which have been collecting for fifty-three years without legal supervision, but by limiting undesirable supplies a brake would be automatically applied to a large proportion of the "jerry" installations that it is the installation inspector's present misfortune to observe and endure with a silence more eloquent than words!

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Immersion Water Heaters

I am interested to learn from "C. A. K." in your issue of July 12th that he has an immersion heater which can give enough hot water for a bath in half-an-hour at a cost of 2 kWh. As one on the sales side of the business I would like to have full particulars of this as I feel sure that an immersion heater such as "C. A. K." has would revolutionise the water-heating problem.

The best I can promise consumers at present is a bath (25 gall. at 102° F.) in approximately two hours at a cost of 4 kWh, using in this case a 2-kW circulator. I gather that in his case he is using a 4-kW heater to which most chief engineers would object.

Mr. Chisholm's article of July 5th was one of the best that I have read, but I wonder why he does not mention the circulator system, as this has all the advantages of the immersion heater over the storage tank which he claims, with the added one of giving small quantities much quicker than the immersion heater. Stocks of spares need not be much larger, as two sizes of circulators are all that should be necessary under the conditions mentioned. INTERESTED.

July 19th.

Portable Alkaline Batteries

In reply to the letter of Alklum Storage Batteries, Ltd., in your issue of July 19th, I may say that real "bus" batteries are not classed as portable, but semi-portable; indeed, the true London Transport bus battery is too formidable an affair to be labelled "portable." The Diesel lorry-type battery is 24 V as a rule, so cannot be "portable" within the meaning ascribed to it in my article and by normal trade usage. Of course, the word "bus" is so loose a term these days that one would hesitate to tie it down to any particular type of vehicle, and some of this class can naturally have portable-type car batteries as starters. The point remains, however, that except in a few isolated cases, alkaline cells are not used as starting and lighting batteries in motor cars. As already pointed out, the reason is not necessarily technical.

I have nowhere in my article mentioned Diesel engines or indirectly referred to them. The high compression which I mentioned was, naturally, for motor cars and not Diesel types. As is well known, petrol engine compression has tended to increase during recent years, and it was obviously in this respect that I alluded to it.

I may add that I was careful to avoid reference to internal resistance, as it is too individualistic to find place in such an article. I am, however, fully aware of the improvements made of recent years in alkaline cells. I possess test results on both Alklum and S.A.F.T. cells as far back as 1923! It was for this reason that I paid tribute to these cells as regards "freedom from defects . . . etc." R. WHEATLEY MINTER.

Bromley, *July 17th.*

The Protection of Domestic Installations

The question of the fault protection of domestic installations continues to be treated in the spirit of *laisser faire*, unfortunately only too commonly adopted with any subject that demands a radical change for its logical solution. Under modern conditions the explosive fuse will have to give way, sooner or later, to a more satisfactory form of protection. The increasing load under modern conditions, and with it the associated complexity of even a small installation, cannot be safely handled by the ordinary domestic fuse. More particularly is this the case since fuses, more than any other part of the wiring installation, lend themselves to serious mishandling by the householder whose enthusiasm exceeds his discretion.

Several people of my acquaintance have been burned through unwise attempts to replace a fuse in a live circuit with a fault still in existence. I commonly see thick copper wire in 5-A fuses. One case within my observation occurred during a breakdown, when the usual enthusiastic meddler stuck a penknife into a live fuse to maintain the supply. In another case the fuses were found to have been repaired by tin foil removed from a cigarette carton.

Even more serious was a case in which one gentleman, determined to keep his lights burning at all costs, inserted thick cable in place of the fuse on the offending circuit, shut his eyes and reclosed the main switch. To his relief the lights kept burning. He was considerably surprised, however, to find that in one room a heavy pendant had crashed to the floor, accompanied by a rain of molten copper, evidences of which were strewn about the room. This is one way of clearing a fault, but it is questionable whether such a method would have been appreciated by anyone in the vicinity of the pendant.

One method of improving the situation is to use, instead of fuses, earth-leakage and overload trips. I am well aware that this is by no means a new idea, but it is sufficiently a departure from the old practice to meet with indifference thinly concealing hostility, the main grounds of objection being increased cost and complexity. Neither of these objections is valid. Even with the limited demand at present existing for small current trips they can be obtained at a cost little exceeding that of the equivalent fuse-gear. The objection of their complexity will be dismissed as absurd by anyone who has used them for any length of time.

Tripping devices are safer and enable quicker re-establishment of continuity than fuses. They do not lend themselves to abuse, can be more accurately calibrated over a wider range, are able to differentiate between an earth fault and a short circuit and reduce the risk of fire, but above all they protect the supplier as well as the consumer in a way that fuses could never do. And yet, strangely enough, neither the I.E.E. nor the supply authorities seriously urge their use.

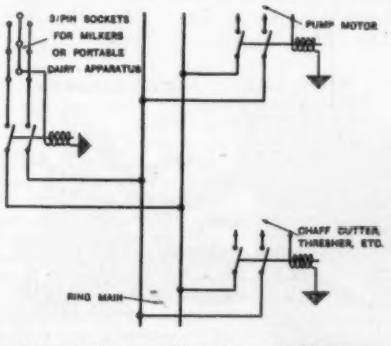
London, E.C.4, *July 20th.* W. ROBINSON, B.Sc.

New Methods in Agriculture

Mr. F. E. Rowland, in his interesting and informative article on this subject in your issue of July 19th, passes over the real problem in rural installations with the simple remark that "metal equipment . . . .must be effectively earthed, which is most easily achieved by providing a special core in the wiring, or running an extra bare conductor."

May I respectfully point out that this is just the way *not* to do it, for several reasons. First, it is most difficult, if not impossible, to earth anything "effectively" in the country, and any attempt to do so will almost certainly lead to trouble. Assuming a high-resistance electrode, the practice of running one common earth wire between several points will make sure that a leakage potential appearing upon one appliance will be extended to all other apparatus, which has already led to serious trouble in this country. Further, if this common earth conductor be bare, then the earth wire itself, and all other metal objects with which it may be in contact, may, under these circumstances, be at considerable potential above earth.

Mr. Rowland states that motors between 2 and 5 h.p. can be controlled by direct-to-line starters. The result of doing so is that overload protective devices are set up well beyond normal running requirements, rendering it difficult to isolate an earth leakage by means of the fuses or circuit-breakers, even in cases of comparatively low earth resistances.



A method of earthing farm appliances

Practical experience has shown the futility of relying upon ordinary earthing methods for rural installations, and I would suggest that the only effective way to apply earth leakage protection to the farm is to treat each individual appliance or circuit, according to usage, quite separately. The central earth conductor, continuous all over the farm, must be eliminated, whether bare or insulated, in order to prevent extension of leakage potentials, and Mr. Rowland's advocacy of tough rubber wiring is sound, easily lending itself to this fundamental requirement. The accompanying sketch shows a sound method of earthing farm appliances, unaffected alike by high earthing resistances or oversize fuses, each individual appliance having its local earth effected through a leakage trip.

This arrangement cannot be criticised upon the score of expense, as the three leakage trips will cost much less than the earth conductor and an attempt to secure a low-resistance earth connection. The cost per machine would probably be: 30-A leakage trip (double-pole), 15s.; copper earth spike and earth wire, 3s.; total, 18s. For direct-to-line starting the leakage trip will operate as the switch, so that for all practical

purposes the extra cost of local earthing is nil. Taking into account the fact that the cost of a central low-resistance electrode, if obtainable at all, can hardly be less than £5 on a farm with the equipment as shown, then money will be saved by the arrangement I advocate.

Further advantages are that (1) only the machine affected by the leakage is isolated, resulting in improved service; (2) small leakages and incipient troubles, so common on farms, are detected and rectified before becoming serious; and (3) all risk of shock to operatives and farm stock is eliminated, and this cannot be ensured by any other means.

Mr. Rowland's wide experience of rural electrification will enable him to appreciate these points, all of which have become apparent in connection with even the small measure of rural electricity supply so far achieved in this country. They have been recognised—and similar remedies applied—for many years abroad. T. C. GILBERT.

Folkestone, *July 20th.*

Electricity in the Laundry

With reference to the article on "Laundry Power and Equipment" which appeared in your issue of July 5th, eight years' experience of the laundry industry makes me doubt whether it is generally realised to what extent electricity is applied in it, although much more could be done as the cheapness, flexibility, reliability and cleanliness of electricity compared with the old type gas or oil engine make it ideal.

The flexible drive made possible by electrical means is essential, as so many different types of machines require variable speed and power; some also require an automatic reversible drive. Moreover, each of the machines usually found in a laundry, *e.g.*, washing machines, require individual treatment in the manner of drive. The choice of cables is of extreme importance and c.t.s. is found to answer admirably in conjunction with watertight fittings and motors.

Washing machines usually require to be driven about three or four revolutions in one direction, and stopped and reversed, the reason for this being, first, to obviate the tangling of the clothes, and, secondly, to ensure the load being properly washed. This can be accomplished by wiring the motor up to a specially designed rotating switch, driven from a shaft, which in turn is driven by a fractional h.p. motor, usually situated on top of the main switchboard in the engine room. The washing machine may be started, inched, or stopped by the usual three-button control box; as a general rule the motor is from 3 to 5 h.p. and totally enclosed. With a.c. circuits a somewhat different system of control is adopted, but the general idea is the same as for d.c.; the drive is positive, through spur and pinion.

Another important point is that the machines may be put down in the most advantageous positions to expedite the journeys through the laundry. In one of the newest laundries an electric conveyor system is used to transfer the loads from one department to the next. Hydro extractors are best driven by short endless belts, and for a.c. motors the star-delta method of connection seems to find favour. They take a heavy rush of current for a short period which drops to about half, gradually flattening out until the current is switched off and the brake applied.

The driving of calenders is best effected by variable-speed motors, and means must be provided to stop the motor instantly in emergency. The Home Office insists that guards must be placed immediately before the first roller, to protect the operatives' hands, and this guard is invariably used as an open-circuiting device. The lighting should be dealt with by a competent illumination engineer. The salient needs to bear in mind are: (*a*) complete absence of shadow: an operative cannot work or press efficiently with a 100-W lamp hung several feet from the ground and casting her shadow on the work; and (*b*) a flux as near to daylight as possible, as a quasi-white light will not show up the colour of the flat work, and what looks white by some lights is distinctly grey or yellow by others. House 'phones should also find their place in the up-to-date laundry to enable the managerial staff to at once get into touch with any of the departments.

The first need of a laundry is an abundant supply of steam and hot water, and though this is not mentioned by the writer of your article among the reasons for the installation of private plant, I believe it is that which considerably influences the decision as to the source of electricity used. E. J. WELLS.

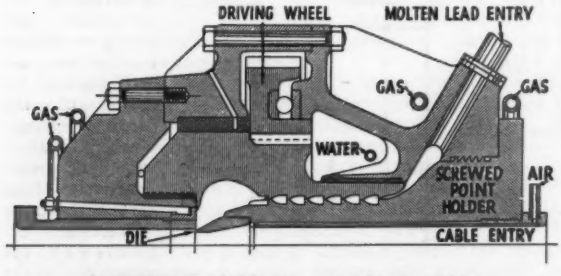
Leicester, *July 21st.*

Lead Extrusion

The production of continuous cable sheathing

THE Henley lead-extrusion machine has been designed to obviate the need to stop the press at the end of a charge and to withdraw the ram for refilling, thus making it possible to extrude a tube continuously in any desired length.

In 1929 Dr. Dunsheath, the chief engineer of W. T. Henley's Telegraph Works, Ltd., first employed the screw extruder



Arrangement of the new extrusion machine

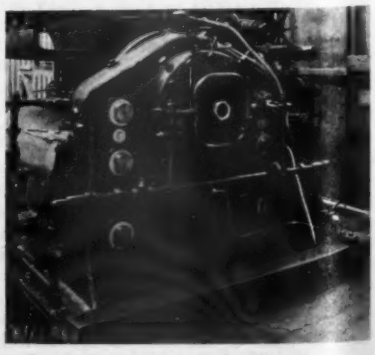
principle for this purpose. He fed molten lead into an experimental machine, cooled the lead after it had become engaged with the screw members, and passed it on to a die chamber for extrusion between a "point" and die, as in previous practice. Within a few months of his first experiments Dr. Dunsheath made what is claimed to be the first length of lead pipe ever extruded by a continuous process. These tentative experiments have been developed until now commercial machines are available.

The lead entry shown on the right of the half-section drawing is connected direct to the lead melting pot. The molten lead passes into the screw-threaded space between a rotating member and a fixed threaded point holder where it is cooled externally. The rotating "driver," carried round by the large spur-gear wheel, also shown in section, takes hold of the lead, now in a semi-solid state, and forces it forward to the left into the die chamber and out between the die and point as a solid tube.

In trial runs pipes of different diameter have been produced, cables of various kinds—dry core, impregnated paper and rubber—have been sheathed, and special sections have been extruded, some of a kind never before made. Not only can plain lead be run satisfactorily but also all the common alloys—lead-tin, lead-antimony, &c.—at a rate of output which appears to be limited only by a suitable design of parts on well-established principles.

As the total length of machine from front to back is only about 12 in. the "point" is rigidly held relatively to the die and the elimination of springing in this way ensures accuracy. Wear of the working parts does not affect the accurate alignment of the point and die and consequently the pipe is always uniform. This feature should permit a reduction of the amount of lead normally added to ensure that a given minimum thickness is obtained.

Pinholes, dross, splits, incipient seams, stop marks and other imperfections either on the surface or within the wall of the pipe, attributable to the intermittent nature of the operation, are obviated. Neither air nor impurity can have access to the interior of the machine, there is no exposure of the internal parts, which are also completely "drowned" in lead, and consequently oxidation of exposed surfaces is impossible. The continuous and rotary motion of the parts as well as the smallness of the machine in comparison with a lead press make for greater uniformity in temperature distribution—in itself an important factor in ensuring uniformity.



A general view of the apparatus

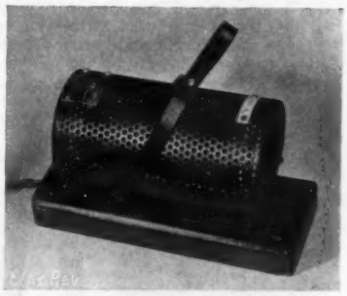
A new company is being formed to exploit the patents and machines will shortly be available.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Slider Dimming Resistances

Special precautions have been taken with regard to safety in the new "Lesdix" slider dimming resistances made by MESSRS. LESLIE DIXON & Co., 218, Upper Thames Street, London, E.C.4.



"Lesdix" enclosed slider dimming resistance

In order to make the electrical contacts inaccessible the slider is situated under a metal case and is operated by a free pivoted handle. An "off" switch may be mounted if desired.

The resistances are suitable for mains use for motor-speed or voltage control in series or as potentiometers. They are also particularly applicable to light dimming and for use in conjunction with cinematograph projectors. Five different models are available with maximum loadings of 50, 80, 150, 225 and 300 W respectively.

An Inexpensive Washboiler

The latest domestic clothes washboiler, the "Satis" model, announced by AMPLEC, LTD., Broad Oak Mill, Church Street, Accrington, Lancs, is of a bucket shape, tapering slightly downward. It is made of sheet-steel with cast-iron legs, and all seams are double lapped for watertightness before galvanising. An alternative grey mottled finish is obtainable at an extra cost.

The 7-gal. "Satis" washboiler

A brass draw-off tap is provided with a loose handle, and the heating elements, which are of the clamp type, are earthed. A galvanised pressed-steel top and hinged lid are fitted, the flat top rim enabling a white enamelled table top to be added. Though of full 7-gallons capacity the model is portable.

Flexible Screened Trailing Cable

In designing their new colliery trailing cable DERBY CABLES, LTD., Derby, were governed by their conviction that, consistent with flexibility, a pliable armour is the most satisfactory and dependable screen it is possible to provide and also that a screen around all the cores is more satisfactory than separate screens around the cores individually.

The Derby cable screen consists of seven-strand ropes laid up round an inner tough rubber sheath in a manner similar to that employed for an ordinary wire armour, the place of each single wire in the latter being taken by a rope. A further and thicker tough rubber sheath is then applied over the screen. The number of ropes applied is sufficient to form a close screen round the laid-up and sheathed cores, while the stranding of the small wires and the very short lay with which the screen is applied allow maximum flexibility. In fact, the difference in the flexibility of Derby pliable armoured and unarmoured cable is practically negligible; for instance, a five-core 0.03-sq. in. pliable armoured cable can be bent by hand with ease to a radius of 5 in. or even less, thus permitting coiling in very confined spaces.

Such a screen gives great additional mechanical strength to the cable, in both transverse and longitudinal directions, and the armour, embedded in the sheath, is claimed to be a perfect "damper" for concussional shock. This electrical screen provides an armour which is stable and reliable, the wires being practically unaffected by the action of sulphur and other constituents of the sheath.

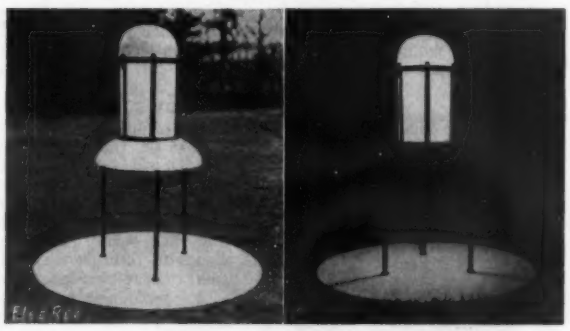
Construction of Derby screened trailing cable

Aerodrome Lighting

To facilitate the landing of airplanes at night OVERHEAD, LTD., 74, Victoria Street, London, S.W.1, has just produced the "Loveridge" boundary beacon, the principal feature of which is the employment of two separate lights which enable a pilot not only to estimate the distance from the landing ground but also to judge accurately the angle at which his approach must be made.

The top part of the light is designed with a standard aviation orange globe, and to improve horizontal illumination the bowl is supported on a white opal glass cylinder. Both the globe and the cylinder are illuminated by one lamp.

The difficulty of estimating the distance from the beacon is overcome by the use of a reflector with a hidden lamp under the opal cylinder. The light from this source falling on to a white or, if desired, coloured disc on the ground makes the whole beacon stand out very effectively.

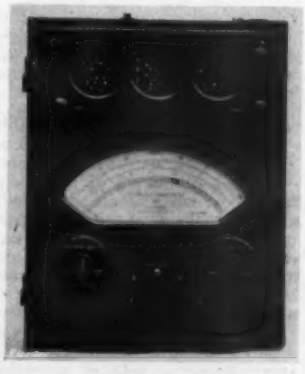


Day and night pictures of the "Loveridge" boundary beacon

The beacon, which renders floodlights unnecessary, can be fitted with a special automatic switch for operation should the light be struck by an airplane, the legs also being specially constructed to collapse readily if hit.

A Universal Dynamometer

The new dynamometer introduced by the CAMBRIDGE INSTRUMENT COMPANY, LTD., 45, Grosvenor Place, S.W.1, embodies a principle suggested by Dr. Drysdale in the use of a magnetic circuit of high grade nickel-iron alloy. A light double-pivoted moving system is employed with pneumatic damping, the pointer coming to rest in less than 4.5 sec. The scale length is approximately 175 mm. with an arc of 100 deg. The standard portable instrument consists of a teak case and lid 12⅛ by 10 by 5½ in. deep. The self-screened movement is mounted on a metal panel and enclosed by a metal cover.



The Cambridge universal dynamometer

Single or three-range voltmeters can be supplied having a resistance of 50 ohms per V, and B.S.S. sub-standard accuracy; the standard ranges are:—0-75, 0-150, 0-300, and 0-600. The standard ammeter is a single-range instrument giving full scale deflection for 5 A. The accuracy is equal to B.S.S. sub-standard grade. Resistance between the terminals is approximately 0.1 ohm.

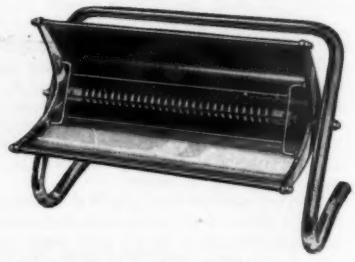
Single- or three-range wattmeters with an accuracy equal to B.S.S. sub-standard grade for a normal current of 5 A, and normal voltages of 150, 300 and 600 are available. The instruments are scaled 0-750, 0-1,500 and 0-3,000 W, and on low power factor circuits, voltages of twice normal can be applied to any range of 300 V or below.

A universal meter combines the functions of a precision dynamometer voltmeter, ammeter and wattmeter. It is provided with self-contained voltage ranges of 0-125, 0-250, and 0-500; the resistance on each range equals 37 ohms per V. The current range is 0-5 A with a resistance between terminals of 0.1 ohm and an inductance of less than 4.5 μH. The watt range is 0-312.5, 0-625, and 0-1,250. It is suitable for 5 A

maximum, and 250, 250 and 500 V maximum on each of the watt ranges. The instrument is provided with a switch for selecting the quantity to be measured, and a range switch which selects the range required.

Small Electric Fires

Among a range of "Essco" electric fires introduced recently by MESSRS. J. & J. SIDDONS, LTD., West Bromwich, is a 1-kW reflector model finished in chromium plate and mounted in a tubular frame so that the angle of reflection is adjustable. There are similar fires with different methods of mounting.



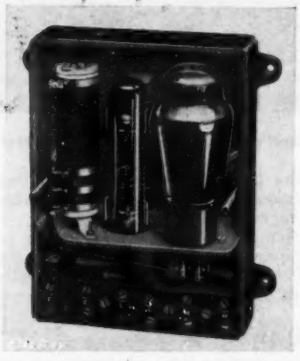
"Essco" fire with tubular frame

Telephones for Flats

MESSRS. W. C. DAVEY & Co., 176, Tottenham Court Road, London, W.1, inform us that they are introducing new telephones, complete with handset, buzzer and push, for service flat working, *i.e.*, permitting tenants to call the hall porter and to be called by tradesmen and the hall porter. Both table and wall designs are available.

Thermionic Valve Relay

Its robust construction and permanency of adjustment make the new thermionic valve relay, just put on the market by SUN-VIC CONTROLS, LTD., 430-431, Bush House, London, W.C.2, particularly suitable for industrial applications such as the automatic control of temperature, pressure, humidity, &c. The instrument forms a very efficient micro-ampère relay and is particularly suitable for control by photo-electric cells.



The Sun-Vic thermionic valve relay

The whole apparatus, including all components, is housed in a cast-aluminium case which, though dust- and damp-proof, is well ventilated in order to keep the pentode valve, vacuum switch and filament resistor cool. A quickly detachable cover permits easy inspection of the components.

It is claimed that the relay has a possible control ratio better than 1 : 10⁵, and that the minimum registered input wattage is so small that the load circuit (capable of carrying 2 kW at 200-250 V) may be controlled directly from very light contacts incapable of carrying an appreciable current. The incorporation of a special vacuum switch obviates "chattering" of contacts, &c.

The instrument will work equally well in any position and is unaffected by vibration. It can be used without alteration on either d.c. or a.c. mains and has an exceptionally long life.

Enamel and Single-paper-insulated Wire

The new "Lewcos" enamel and single-paper-covered conductor has been produced to meet a demand for an insulated winding wire having high dielectric strength with a low space factor. It consists of enamelled wire plus a layer of high-grade non-ageing insulating paper which is applied by a special process to prevent the paper unravelling or sliding over the wire when cut. From a mechanical point of view the covering is very robust, and the wire can be bent on a mandrel only a few times the diameter of the bare copper conductor and the insulation will not show signs of opening or cracking.

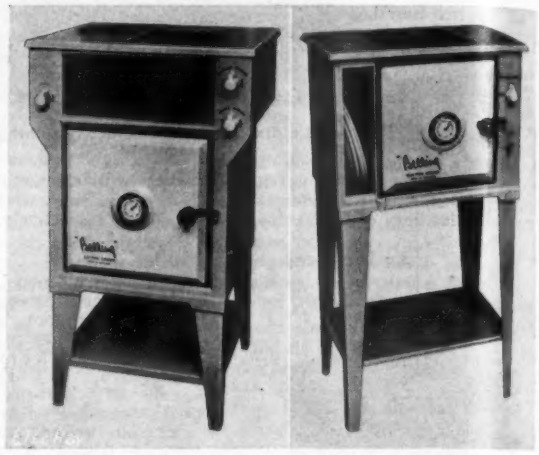
The smooth overall finish facilitates easy handling and accurate bedding down of turns when winding coils, and the paper covering acts as a cushion and dispenses with the need for interleaving coils, while it also affords a medium for the absorption of impregnating varnish. The makers, the LONDON ELECTRIC WIRE CO. & SMITHS, LTD., Playhouse Yard, Golden Lane, London, E.C.1, state that the dielectric strength of this type of enamel and single-paper-covered wire is approximately twenty-five times greater than that of double-cotton covering. It is suitable for use in machines and apparatus running at higher temperatures than normally adopted, and the paper covering will not ignite when held in a flame. For a given length the weight of this wire is slightly less than other coverings.

Light-construction Cookers

Referring to their recently introduced low-priced and light-construction cookers, MESSRS. BELLING & Co., LTD., Bridge Works, Southbury Road, Enfield, Middlesex, say there is no reason why these models should not be just as durable and last as long as the heavier type of cast-iron cookers.

The front frame in each case is of cast iron and the remainder of the body is of heavy-gauge pressed steel, vitreous enamelled both inside and out. The "Baby," "Modernette" and the "Moderne" have 11-in., 12-in., and 13-in. cube ovens, respectively. The standard Belling 8½-in. square 2,000-W boiler-griller is common to all three equipments, but in the case of the "Baby" it serves as top oven heat as well. Only the largest cooker has a 6½-in. 900-W circular boiling plate as an additional hob unit. The two larger models have open-fronted grilling and plate-warming chambers and distinction is given to the "Baby" by its side vertical plate-warming cupboard. The smallest unit has an additional 500-W element with single-heat control for bottom heat, and this element and the oven elements on the larger models are all situated on the exterior of the oven lining.

A reliable heat indicator on the white-enamelled door and mottled finish are other common features, and the two larger cookers have tall legs to which a pot shelf is secured. A neat stand is available for the "Baby" as an extra fitting.



The Belling "Moderne" and "Baby" cookers

Regulated-draught Crucible Furnace

An electrically driven blower is an essential feature of the pit-fire crucible furnace obtainable from MR. C. E. KNY, 19-21, Palace Street, London, S.W.1. One of the main advantages of this arrangement is the close regulation of the draught made possible by its means, enabling special alloys to be produced which cannot be done with the traditional pit fire. The furnace consists of a rectangular steel box lined with fire-bricks which withstand a temperature of 1,750 deg. C. About one-third is sunk, and the height above ground is 2 ft. 6 in. Two sizes are made, one for 150 lb. and the other for 250 to 300 lb. charges. With the smaller size preheating takes twenty minutes and fusion of the charge with the coke forty-five minutes. It is claimed that the crucible will stand up to more than 120 heats.

A J.P. Convector

The convector heater which we illustrate has been introduced by the J.P. TUBULAR HEATER CO., LTD., Newarthill, Lanarkshire. It is made in two sizes, 1½ and 2 kW, and arranged with two switches to give either half or full heat. The element operates at a black heat, but a lamp is incorporated in the body of the convector to reflect a glow to both the top and bottom grills. The heater delivers air, raised to a temperature of 120 deg. F., at approximately 200 cu. ft. per minute.

The standard finish of the casing is a dark matt brown, but a polished walnut table top is obtainable.

The J.P. convector

A Foot-operated Switch

The foot switch made by KINGSWAY ELECTRICAL SERVICES, described by us last week, is called the "K.E.S.," not the "Kingsway" switch as stated.

Sweden's Foreign Electrical Trade

The United Kingdom's share

THE following statement gives the values last year, with a note of increases or decreases compared with 1933, of the principal items in Sweden's import and export trade in electrical goods. It will be noticed on the import side that although Sweden's purchases of power station plant from abroad increased by 50 per cent. her exports continued to advance and are two and a half times the value of her imports of such apparatus. Of insulated wires and cables she is a larger importer than exporter, a fact which has benefited the United Kingdom, although to a less extent than Germany. In imports of batteries, accumulators, etc., the United Kingdom has overtaken Germany as a supplier and on balance Sweden is a larger importer than exporter. Progress by the United Kingdom is also noticeable in other lines but on the whole she is still far behind Germany in the electrical trade of Sweden. (Kr. 19½ = £1 approx.).

	1934 Kr.(000)	Inc. or dec. Kr.(000)
EXPORTS.		
Motors, generators, transformers and converters—		
Total	10,955	+ 1,429
To United Kingdom	881	+ 530
„ Russia	42	− 917
„ China	322	+ 56
„ Persia	4	− 59
„ Irish Free State	244	+ 49
„ Japan	165	+ 67
Vacuum cleaners—		
Total	6,075	+ 1,147
Accumulators and parts—		
Total	1,709	+ 88
Stators, rotors, current collectors, etc.—		
Total	4,581	+ 1,661
To United Kingdom	1,095	+ 339
„ France	1,035	− 35
Switches, etc.—		
Total	887	+ 344
To United Kingdom	442	+ 419
Telegraph and telephone apparatus—		
Total	6,068	+ 1,445
To Italy	710	+ 320
„ British South Africa	282	− 38
„ Poland	2,772	+ 942
„ India	15	− 255
Insulated wires and cables—		
Total	1,978	+ 40
To United Kingdom	20	− 22
„ Mexico	168	− 12
„ China	154	+ 130
„ Poland	112	+ 95

	1934 Kr.(000)	Inc. or dec. Kr.(000)
Metal filament lamps—		
Total	1,182	+ 380
To Denmark	245	− 32
„ Norway	236	− 7
Carbon for electrical purposes—		
Total	357	+ 162
To United Kingdom	17	+ 4
„ Norway	104	+ 51
Radio apparatus—		
Total	1,328	+ 439
To Finland	513	+ 283
„ Brazil	10	− 73
„ Argentina	7	− 69
IMPORTS.		
Batteries, accumulators and parts—		
Total	2,189	− 99
From United Kingdom	620	+ 212
„ Germany	590	− 330
Radio apparatus—		
Total	10,690	+ 2,820
From United Kingdom	1,570	+ 770
„ Germany	2,980	− 310
„ Holland	4,240	+ 1,550
„ United States	780	+ 430
Motors, generators, transformers and converters—		
Total	4,140	+ 1,380
From United Kingdom	150	+ 35
„ Germany	3,100	+ 975
Stators, rotors, current collectors, etc.—		
Total	774	+ 299
From United Kingdom	34	+ 20
„ Germany	605	+ 243

	1934 Kr.(000)	Inc. or dec. Kr.(000)
Metal filament lamps—		
Total	1,160	+ 140
From Germany	510	+ 120
„ Holland	363	+ 48
Carbon for electrical purposes—		
Total	2,420	+ 675
From United Kingdom	375	+ 175
„ Germany	815	+ 285
Regulating and control apparatus—		
Total	243	—
From United Kingdom	13	+ 13
„ Germany	171	− 26
Switches, etc.—		
Total	2,740	+ 480
From Germany	2,485	+ 485
„ United Kingdom	16	− 29
Electricity meters—		
Total	740	− 104
From United Kingdom	4	+ 4
„ Germany	699	− 102
Other electrical measuring instruments—		
Total	875	+ 219
From United Kingdom	61	+ 61
„ Germany	640	+ 106
Insulated cables and wires—		
Total	3,255	+ 1,455
From Germany	2,570	+ 1,130
„ United Kingdom	127	+ 82
X-ray apparatus—		
Total	100	+ 19
From Germany	149	+ 1
Vacuum cleaners—		
Total	427	+ 131
From Germany	406	+ 128

Government Contracts

THE following contracts were placed by various Government Departments during June :—

ADMIRALTY.

Electrically driven capstan gear.—Napier Bros. Sub-contractors for electrical gear : W. H. Allen, Sons & Co.

Condensers.—Muirhead & Co.; Dubilier Condenser Co.; Telegraph Condenser Co.

Electric jib crane.—Cowans, Sheldon & Co. Sub-contractors : Laurence, Scott & Electromotors for motors; E.M.B. Co. for control gear.

Electrical gear for dehumidifying plant.—Laurence, Scott & Electromotors.

Electric furnace.—Birmingham Electric Furnaces.

Generators.—Electric Construction Co.; Ruston & Hornsby.

Motor-driven lathes.—Denham's Engineering Co.; J. Lang & Sons. Sub-contractors for electrical equipment : B.T.H.; Igranic Electric Co.

Electrical equipment for planing machine.—Lancashire Dynamo & Crypto.

Punching and shearing machine.—H. Berry & Co. Sub-contractors : Lancashire Dynamo & Crypto for motors; Allen West & Co. for starter.

Modifications to seaplane crane.—Sir William Arrol & Co. Sub-contractors : Laurence, Scott & Electromotors for motors; Allen West & Co. for controllers.

W.t. panels.—Marconi's.

Electrically driven submersible pumps.—Pulsometer Engineering Co, Sub-contractors : Met.-Vick. Elecl. Co. for motors.

Rotary screening plant.—Ledward & Beckett. Sub-contractors : Laurence, Scott & Electromotors for motors; Igranic Electric Co. for control gear.

WAR OFFICE.

Batteries and cells.—Chloride Elecl. Storage Co.

Electric cable, w.p. cases and cable drums.—Siemens Bros.

X-ray apparatus.—Schall & Son.

POST OFFICE.

Telegraphic apparatus.—G. A. Harvey & Co.

Telephonic apparatus.—H. E. Ashdown (Birmingham); Automatic Electric Co.; Ericsson Telephones; G.E.C.; Phœnix Telephone & Elect. Works; Telephone Manufacturing Co.

Testing and protective apparatus.—Chamberlain & Hookham; Creed & Co.; G.E.C.; Plessey Co.; Standard Fuse Co.; Westinghouse Brake & Signal Co.

Wireless apparatus.—Walters Electrical Manufacturing Co.

Cable.—B.I. Cables; Connollys (Blackley); G.E.C.; Hackbridge Cable Co.; Henley's; Siemens Bros.; Standard Telephones.

Vacuum cleaners.—British Vacuum Cleaner & Engg. Co.

Loading coils.—G.E.C.

Insulators.—J. Bourne & Son; Bullers; Thomas De La Rue & Co.; Doulton & Co.; Litholite Insulators & St. Albans Mouldings.

Leclanché jars.—Forster's Glass Co.

Voltmeters.—Everett Edgecumbe & Co.

Wire.—British Ropes; Enfield Cable Works; Richard Johnson & Nephew; Nevill, Druce & Co.; Pirelli-General Cable Works; R. H. Symonds; Whitecross Co.; G.E.C.; London Electric Wire Co. & Smiths; Macintosh Cable Co.; Reliance Electrical Wire Co.

Cabling and loading coils.—Modbury-Salcombe; Newton Abbot-Teignmouth.—Pirelli-General Cable Works. Sub-contractors for loading coils : Salford Electrical Instruments. Wolverhampton - Shrewsbury : Chester - Wrexham. — Siemens Bros.

Cabling, loading coils and terminations.—Tunbridge Wells-Hastings; London-Tunbridge Wells.—Standard Telephones.

Electric lift.—Woking new sorting office.—Evans Lifts.

Electric lighting and power wiring.—Birmingham Telephone House.—B. French.

L.p. switchgear.—Birmingham Telephone House sub-station.—M. & C. Switchgear.

Telephone exchange equipment. — Maidstone; Hatfield, Bushey Heath and trunk exchanges (London); Hounslow.—Standard Telephones. Farnham; Leeds; London Wall (London); West Bromwich; Westbury-on-Trym; Birmingham.—Automatic Electric Co. Flaxman (London).—G.E.C.

Telephonic repeater equipment.—Inverness; Faraday Building South Block (London).—Standard Telephones. Belfast.—Austinlite. Sub-contractors for Belfast : Electric Construction Co. for motor generators; Victor Oil Engine Co. for oil engines; D.P. Battery Co. for batteries. Birmingham.—G.E.C.

Transformers, e.h.p. switchgear, cables and l.p. switchgear.—Birmingham Telephone House sub-station.—B.T.H.

AIR MINISTRY.

Accumulators.—Oldham & Son; Peto & Radford.

Terminal and connector blocks.—Telephone Manufacturing Co.; Oliver Pell Control.

Electric drilling machine.—S. Wolf & Co.

Generators and accessories.—D. H. Bonnella & Son; G. E. Mortley Sprague & Co.; B.T.H.

Electric lamps.—G.E.C.; Siemens Elec. Lamps & Supplies; B.T.H.; Plessey Co.

Neutralising units.—Ferranti.

Plugs and sockets.—G.E.C.; Oliver Pell Control.

Power house plant.—English Electric Co.

Switchboxes and switches.—Phœnix Telephone & Elect. Works; Oliver Pell Control.

Dimmer switches.—D. H. Bonnella & Son.

W.t. valves.—A. C. Cossor.

Wireless receivers, spares and accessories.—Siemens Bros.; Radio Instruments; Plessey Co.; Standard Telephones.

Wireless transmitters, spares and accessories.—Plessey Co.; Standard Telephones.

W.t. mobile station.—Standard Telephones.

H.M. OFFICE OF WORKS.

Motor generator set.—Road research station, Harmondsworth. —Lancashire Dynamo & Crypto.

CROWN AGENTS FOR THE COLONIES.

Automatic telephone exchange apparatus.—G.E.C.

Electrical equipment for water supply.—National Gas & Oil Engine Co.

Telephone apparatus.—Siemens Bros.; G.E.C.

Train lighting spares, &c.—J. Stone & Co.

The Central Board's Finances

Ministry says "optimistic" hopes will be realised

ON July 18th in the House of Commons Mr. Horobin raised the question of the financial position of the Central Electricity Board. He said that the Board's borrowing powers extended to no less a sum than £60,000,000, of which the major portion had already been borrowed. The responsibility was fairly upon Parliament and upon the Minister, because by a procedure which was becoming more and more common, although it was not altogether without its dangers, this huge sum of money was not in the hands of any authority which could be dealt with by the ordinary company procedure in general meeting where questions could be asked. The responsibility was upon the Minister of Transport under the Act for giving Parliament the only information that they could obtain, the form of accounts had to be approved by him. The form of these accounts was, in fact, exceedingly unsatisfactory. It did not give information which the House and the country ought to have.

Although that vast sum had been spent on capital expenditure on the grid they were entirely in the dark as to what, if any, provision had been made for obsolescence and renewals. They had been given no particulars of the capital expenditure apart from a gross sum and, perhaps, most curious and objectionable of all, there was no provision in the revenue account for showing exactly what the sales of current were. The whole of the interest and sinking fund upon this enormous capital expenditure was being borrowed and added to capital account. That was a dangerous procedure and one which required to be watched carefully.

The fear that the Board would not be self-supporting was not an imaginary one. There was a scheme for rural electrification in Bedfordshire; and another in Dumfries-shire, where a loss equivalent to a sixpenny rate throughout the county had been incurred. There was another in North Wales, where the Government was already pressed by the local authority to give general financial assistance to rural electrification, because otherwise there was no likelihood that the scheme would be remunerative.

The 1934 report of the Board showed that from the revenue account there was a turn of about 5 per cent. between the buying and selling prices of electricity. He calculated that by 1942 an increase in the resources of the Board of no less than £2,000,000 would be required to meet interest and sinking fund charges upon capital. The gross turn, as shown in these accounts, was only about £1,000,000. That meant that within a few years the gross revenue of the Board would have to be multiplied about three times and would have to go up from the present sum of £1,000,000 to about £3,000,000. It was exceedingly unlikely that the increase of 50 per cent. in five years was going to be turned into an increase of about three times that figure.

At present we were using something like 15,000 million kWh a year. The United States, with considerably more than three times our consumption per head, reached a figure in 1929 which they had never reached since, and even then they only arrived at a figure of 90,000 million kWh. Allowing for an increase of something like 25 per cent., due to general trading, to come into operation all over the country, if we were to have an increase of three times, it meant that there would have to be a consumption in this country of something like 30,000 million kWh by 1942. He was not going to say that that was an impossible consumption, but it was a very optimistic one, and if it was on that assumption that the Board's plans were being made, it was well that the public should be told at an early date. The Weir Committee calculated that the probable consumption in 1942 would be about 21,000 million kWh. If that figure was realised, a deficiency of something like £7,000,000 per annum of gross income would be in store for us in the early '40s.

The Ministry's Reply

The Parliamentary Secretary to the Ministry of Transport (Capt. Hudson) said that the Minister's powers under the Act of 1926 were fairly strictly regulated. Section 25 laid upon the Minister the duty of prescribing the form of report by the Board, and Section 30 laid upon him the duty of prescribing the form of and the particulars to be contained in the annual report and accounts which that Section required the Board to prepare and publish. But Parliament definitely laid certain obligations on the Board. First, that the tariff should be so fixed that, over a term of years to be settled by the Board itself, receipts should balance; and, secondly, that the express powers which Parliament granted for the payment of interest out of capital, and for the suspension of sinking fund, should be exercised with the approval of the Treasury and subject to the consent of the Commissioners.

The Board had taken ten years as the period over which it thought it could make the scheme pay. All the areas had different starting times for that period, and therefore while at the present moment it was obvious that certain of them had only just started and could not be remunerative, others were now remunerative. For instance, Central Scotland and Mid-East England started on January 1st, 1933, and South-West England and South Wales on January 1st, 1935. The Ministry could not ask the Board to give these figures separately for the reason that in cases which started earlier, where the schemes were already remunerative, there might be a big surplus, and there would be a demand from them for lessening the charges. The whole idea of the grid was that the schemes should be taken as a whole. There was the further slight complication that the intercommunication of grid areas made it difficult to give these figures.

The Board was confident that it would be able to make the scheme pay for the budget period, and in view of the tremendous increase which was bound to come in the use of electricity, he believed that very optimistic feeling at the present moment would be fully justified by the facts.

In the Courts

MR. JUSTICE ATKINSON, in the King's Bench Division on July 17th, delivered a considered judgment on the counterclaim brought by the defendants in the case of Normalzeit G.m.b.H., of Frankfurt, Germany, against the Synchromatic Time Recording Co., Ltd., Liverpool. On January 15th last his Lordship gave judgment for the plaintiffs on their claim subject to the present counterclaim by which the defendants, who were the sole agents for the plaintiffs in the United Kingdom, alleged that the plaintiffs in breach of an agreement had wrongfully declined to supply them with equipment so that they were unable to carry on their business of installing electric clocks and similar apparatus and in respect of which breach the defendants claimed damages.

The plaintiffs denied liability or breach of agreement and contended that if they had refused to supply the defendants with the material in question they were entitled to do so because the defendants were indebted to them for goods supplied and thereby had repudiated the agreement.

The defendants, while denying that they had repudiated the agreement, alleged that the plaintiffs were in competition with them and that a number of "key" men who formerly worked for the defendants were now employed by the plaintiffs and the contracts had to be cancelled by the defendants.

His Lordship, in giving judgment, said he had held that the plaintiffs were entitled to recover on their claim £657 payable in gold—that was to say they were entitled to such a sum as would enable them to purchase the same number of marks as they could have purchased at the relevant time at the old par rate of exchange. On the counterclaim he held that the defendants were entitled to £3,775. The defendants would have the costs on both claim and counter-claim.

His Lordship refused to grant a stay of execution with a view to an appeal from his decision.

A Withheld Supply

In the Justiciary Appeal Court on July 18th an appeal by James Brand from a judgment by Sheriff-Substitute Bartholomew, Glasgow, in favour of the Glasgow Corporation was dismissed by a majority.

The appellant's case was that the Corporation had committed a breach of its statutory duty by refusing to give him a supply of electricity. It appeared that the agents for the house occupied by the appellant stipulated that the house should be wired with "cables not smaller than 3/.036 s.w.g." The wiring actually installed on appellant's behalf was 3/.029 and the agents refused to approve the installation for use.

The Sheriff-Substitute, while agreeing that the installation as it stood might be quite safe for use if the number of points was not increased, held that the Corporation was justified in withholding a supply in the absence of the agent's consent.

In giving judgment on the appeal, Lord Hunter held that the Sheriff-Substitute was right, as the owners or agents of the property were interested in the question of fire risk and might have had cause for action against the Corporation if it had ignored their refusal to consent to a supply.

Lord Anderson concurred, but the Lord Justice Clerk dissented, maintaining that the Corporation was bound to give a supply when a tenant asked for it irrespective of the views of the owners or agents if the installation was not calculated to affect injuriously the use of energy by the undertakers or by other persons.

Non-compliance with Mines Regulations

Fines totalling £68 were imposed by the magistrates at Moot Hall Police Court, Newcastle, on July 19th, on the owners, agent, manager and electrician of the Montagu Main Colliery, Caroline Pit, Denton Burn, Newcastle, for alleged offences under the Mines Act.

It was stated that when a mines inspector visited the pit he found an electric conveyor, an electrically driven coal-cutter, gate-end switches, conveyor motor and starter, auxiliary fan motor unit panels, and a gate-end switch not constructed so as to prevent open sparking, and certain apparatus and conductors not so constructed as to prevent danger.

For the defence it was stated that the pit was an old one, having been started in 1700, and the company was putting all the defects in order. Since the pit had been taken over nearly £14,000 had been spent on modernising the plant.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

A New Exhibition Building for London

A large permanent exhibition at Earl's Court is to be erected at a cost of £1,250,000. A long lease of the Earl's Court Exhibition site, which covers an area of nearly nineteen acres, has been granted by the London Passenger Transport Board to Earl's Court, Ltd., a company which has been formed for the purpose. The new building is to be completed by the end of 1936, and part of the British Industries Fair will be held there early in 1937. In addition the Ideal Home Exhibition and the Motor Show will also be transferred to the new centre. The London Passenger Transport Board is considering alterations to the Earl's Court station and the installation of escalators giving direct access to the building. One of the innovations embodied in the design of the building is the employment of interior floodlighting and apparatus for scenic effects. The new building will naturally have a very large electric lighting and power installation. The designer of the building is Mr. C. H. Crane, in collaboration with Mr. G. Geeves, who will act in an advisory capacity.

The prospectus was published on Monday last by Earl's Court, Ltd., and the subscription list was opened on Tuesday for the issue at par of £400,000 5½ per cent. second mortgage debenture stock and 1,600,000 ordinary shares of 5s. each.

Building Centre Extension

Owing to the increasing demand for exhibition space, and to make provision for further activities, the Building Centre has acquired the lease of the Grafton Galleries, which will be connected up with the present premises in Bond Street. This will nearly double the area of the Building Centre. One section of the Grafton Galleries building will be occupied by the British Electrical Development Association and will provide one of the largest and most comprehensive electrical showrooms in London. The new extension will be formally opened as soon as the necessary alterations and rearrangements are completed.

New Workington Showrooms

An exterior decoration scheme of cream, green and black gives the new showrooms and offices of the Workington Corporation Electricity Department in Oxford Street a very attractive appearance. The building, which is constructed of steel, concrete and brick, comprises a sub-station and general stores in the basement, meter department, showrooms and demonstration room on the ground floor, with the general offices above. Warming of the building is carried out entirely by tubular heaters, and thermostatically controlled electrical storage heaters are used in the demonstration room and each lavatory. All the principal rooms are equipped with intercommunication telephones and electric clocks, and the front and sides of the building are to be floodlighted. The sub-station deals with the whole of the supply from the Central Electricity Board and is used as a h.p. transformer sub-station for the centre of the town and a distribution centre for the other Corporation sub-stations in the district. The building was designed by the borough surveyor, the whole of the electrical equipment having been installed by the Corporation's electrical staff.

The Workington Electricity Department's new showrooms and offices in Oxford Street. The right-hand picture shows a portion of the general showrooms

A New Electrical Accessories Association

We are asked to state that an association of manufacturers of electrical accessories has been formed under the title of the Electrical Accessories Association, with headquarters at 36, Kingsway, London, W.C.2. The need for such an association has been long felt; indeed, ten years ago there was in existence an Electrical Accessories Manufacturers' Association. We understand that already the majority of British accessories manufacturers have joined the new association, so the organisation has made a very promising start. The main objects are to promote, develop and safeguard the interests of manufacturers, distributors and users of electrical accessories by mutual co-operation. The E.A.A. aims to provide for the more advantageous utilisation of manufacturing resources for the production of electrical accessories of uniformly high quality and to provide efficient arrangements for their distribution. The management is vested in a representative council, of which Mr. H. M. Harris is chairman. Information concerning the Association can be obtained from the secretary at 36, Kingsway, W.C.2.

Electricity Supply Workers' Wages

The Industrial Court has awarded an increase of ¼d. per hour in the wages of workers in the electricity supply industry. The award takes effect from the first pay day after July 17th.

Employment in June

Employment during June improved in general engineering, but little change occurred in most sections. Statistics published in the *Ministry of Labour Gazette* show that the number of unemployed was 120,296, the percentage rising from 12.4 to 12.5 as compared with the previous month (13.8 per cent. in June, 1934). In the electrical engineering section the number of unemployed was 6,238, as compared with 6,289, the percentage being 6.8, a decrease of 0.1 per cent. (7.9 per cent. in June, 1934). The number of unemployed in the electric cable, apparatus, and lamp manufacturing group was 11,511, as compared with 12,584, the percentage falling from 9.4 to 8.6. There was a further increase, however, in the electric wiring and contracting industry from 4,914 to 5,339, with a consequent percentage increase from 14.7 to 16 (14.4 per cent. in June, 1934).

The T.V.A. Scheme

A short time ago the Northern Alabama Federal District Court pronounced illegal the United States Government's scheme for the setting up of the Tennessee Valley Authority to generate power from the Tennessee River and sell it in competition with private power companies over a wide area of Alabama. Last week, on appeal, the Federal Circuit Court of Appeals reversed this decision holding that the Government had a perfectly legal right to dispose of its property as it thought fit, even though in doing so it came into competition with private interests. Special reference was made in the judgment to the fact that the Wilson Dam, Muscle Shoals, was erected under an Act of 1916 for the purpose of supplying water power for the production of munitions of war and improving navigation on the Tennessee River. The opponents of the scheme are taking the matter to the United States Supreme Court for a final decision.

Johannesburg Tramcar and Trolley Bus Contracts

The tenders for fifty new tramcars and twenty-two trolley buses required for the Johannesburg Municipal transport system have been considered and recommendations have been made by the Tramways and Lighting Committee. All the contracts go to British concerns, their total value being £304,432, of which £232,476 is for tramcars and £71,956 for trolley buses. For the tramcars the tender of Vickers and Metropolitan Carriage (South Africa), Ltd., is recommended. These are complete with Metropolitan-Vickers remote control regenerative equipment, and with 38-ft. bodies each capable of seating seventy-eight passengers. Twenty-five of the tramcars are to be fitted with trucks by E. M. B. Co., Ltd., of West Brom-

wich, and twenty-five with trucks by Maley & Taunton, Ltd., of Wednesbury. In its report the committee states that the general public requires high scheduled speed, comfort and silence, and that Johannesburg, sparsely populated in the outer areas, demands a higher speed schedule than most European cities which have greater density of population. Regarding the trolley buses, it is recommended that the tender of the Griffin Engineering Co., Ltd., be accepted for the supply of eleven two-axle chassis by the Associated Equipment Co., Ltd., of London. The electrical equipment for these will be by the English Electric Co., Ltd., Bradford. The tender of Vickers and Metropolitan Carriage (S.A.) Ltd., is recommended for eleven bodies to be fitted on the A.E.C. chassis. For the supply of the other eleven trolley buses the tender of Sunbeam Commercial Vehicles, Ltd., for two-axle chassis is recommended, the electrical equipment being by the British Thomson-Houston Co., Ltd., of Rugby. For the bodies on the Sunbeam chassis the tender of Vickers and Metropolitan Carriage (S.A.) Ltd., is also recommended.

The Royal Sanitary Institute Exhibition

The accompanying illustration shows the stand at the Royal Sanitary Institute Congress Health Exhibition, Bournemouth, arranged by the British Electrical Development Association in conjunction with the Bournemouth and Poole Electricity

The electrical display by E.D.A. and the Bournemouth and Poole Co. at the Royal Sanitary Exhibition, Bournemouth

Supply Co., Ltd. An effort was made to demonstrate, as far as possible, the relationship between electricity supply and public health—the latter necessarily being interpreted very broadly. The main object of the exhibit was to convey to medical and sanitary inspector delegates the numerous ways in which electricity is indirectly assisting to improve the nation's health. Three attendants were continuously engaged on the stand to emphasise these objects by demonstration. The dioramas which can be seen at the back of the stand were carefully selected to illustrate the influence of electricity in public places, such as tubes and electric vehicles, cinema theatres, hairdressing establishments, &c. Optical hygiene was dealt with by means of the light vision tester lent by E.L.M.A. The display was awarded a silver medal by the Royal Sanitary Institute.

The Machinery Users' Association

In reviewing the activities of this Association during the year ended March 31st last, the General Council states that there has been a considerable extension of the usefulness of the Association, the membership of which includes the largest manufacturing, industrial and other trading concerns in the United Kingdom.

Electrical Arbitration in France

The Chamber of Conciliation and Arbitration in the French electrical industries in France, which was formed in 1926, has now been reorganised under the chairmanship of M. Henri Cahen, president of the Union des Syndicats de l'Electricité. It now comprises twenty-eight syndicates in the various branches of the industry and the offices have been transferred to those of the Union, 54, Avenue Marceau, Paris 8.

Dutch Radio Exports

The Central Statistical Bureau reports a slight increase in the tonnage and value of the exports of radio apparatus in June. For the six months the value of the exports amounted to 17,750,000 fl., as compared with 44,703,000 fl. in the whole of 1934. In wire filament lamps the value of exports during the six months reached 2,630,000 fl., as against 6,687,000 fl. for the whole of last year.

Australian Market Expansion

During the last half of 1934 a large increase took place in the imports of electrical machinery and appliances into Australia, their total value being £1,233,900, compared with £752,500 in the corresponding period of 1933. Prominent among these imports were covered cable and wire to the value of £340,000 (against £211,000). Imports of dynamo electric machines, at a total value of £132,000, were about the same as during the corresponding six months of 1933, but the group which includes telegraph instruments, telephones, and telephone switchboards increased from £34,700 to £119,050, and imports of filament lamps stood at £109,100 (£60,360). The value of unclassified electrical machinery and appliances imported was £523,400, as compared with £308,000.

An E.A.W. Questionnaire

The London branch of the Electrical Association for Women has circulated to its members a form in which particulars of the electrical arrangments on housing estates are to be inserted. This is a preliminary move in an inquiry which the branch is conducting and it is hoped that other branches of the Association will follow suit.

The Dumping of German Products

An amount of 1,000 million marks is now being raised in Germany by means of a percentage levy on the inland turnover for the purpose of granting financial assistance for the dumping of German products in export markets. The electrotechnical industry is to contribute 2 per cent., yielding a total of 30 million marks, the metallurgical industry 56 millions, the chemical industry 135 millions, and the mechanical industry 65 millions. Applications for subsidies from the fund will be investigated by a special commission. The dumping grants will not be the same for all countries. Thus the export premium for certain articles to France will amount to 20 per cent., while on the same products intended for England, the export premium will be 30 per cent. Severe penalties will be imposed in the case of any firms or industries endeavouring to evade the compulsory levy on their home turnover.

Henley Tyres

Henley's Tyre & Rubber Co., Ltd., has long been well known for its automobile tyres, but mainly for the solid variety. This week sees the introduction of the new "Vanguard" pneumatic tyre which has been specially designed to meet modern requirements, both with regard to long life and road grip. With the thoroughness which characterises the manufacture of all Henley products, both rubber and electrical, the company has left nothing to chance, and every tyre and every component of the tyre are subjected to the most stringent of tests, many of which have been "borrowed" from the cable factory. The company does not believe in piecework in any stage of manufacture, and Sir Montague Hughman, chairman of Messrs. W. T. Henley's Telegraph Works Co., Ltd., tells us that the company is satisfied that the tyre is a first-class production.

Wages in the Cable-making Industry

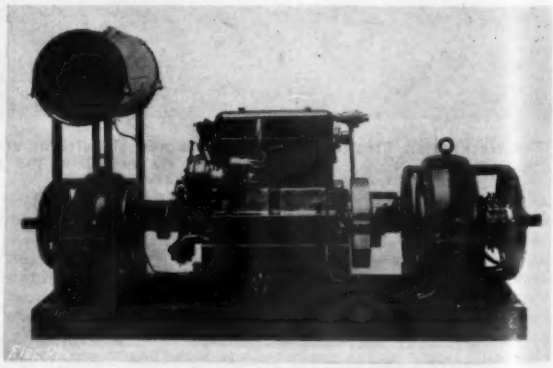
The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages on the third pay-day in August.

Trading in Mexico

A confidential memorandum on the methods of trading and the appointment of agents in Mexico, prepared by H.M. Consul-General, Mexico City, has been issued by the Department of Overseas Trade to firms on its Special Register. United Kingdom firms desirous of obtaining a copy of this memorandum should apply to the Department at 35, Old Queen Street, S.W.1, quoting C.Y.4530.

Plant for Submarine Cable Service

The Parsons Oil Engine Co., Ltd., Southampton, has recently completed an order for five special generating



A Parsons 25-h.p. stationary petrol engine coupled to two dynamos for submarine cable service

sets for Standard Telephones & Cables. These sets, which are destined for the Australian-Tasmanian submarine cable service, possess a number of points of interest. It will be seen from the accompanying illustration that the engine is coupled to two dynamos, one at each end, and the couplings are of a special detachable-pin type, which can be drawn out of engagement by hand at any time, leaving only one dynamo coupled. The engine starting handle is transferred to the dynamo end of the plant, and right and left handles are pro-

vided so that either dynamo can be started up independently of the other. The starting dogs are efficiently guarded as are the couplings. The larger set comprises a Parsons 25-h.p. stationary petrol engine coupled to E.C.C. dynamos, No. 1 being 240 A, 20-35 V, and No. 2 15 A, 120-180 V. The set is also fitted with a fuel tank to hold enough fuel for a 12-hour run. There are three engines of this size, one being destined as a single plant for one station, and the other two for another station. The two further equipments of similar type comprise 10-20-h.p. D4 engines direct coupled to similar dynamos, the outputs being 65 A, 20-35 V, and 50 A, 120-180 V, respectively.

Social Event

Employés of Messrs. Ferranti, Ltd., numbering approximately 2,500, recently held their annual works outing, visiting Blackpool. Four special trains were chartered for the occasion.

A Switchgear Demonstration Van

The accompanying illustration shows a switchgear demonstration van which has recently been put into service by Messrs. Crompton Parkinson, Ltd. The van, which was manufactured by the Associated Equipment Co., Ltd., contains representative examples of modern Crompton switchgear.

An Electricity Consumers' Association

It is reported that the formation of an Electricity Consumers' Association has been decided upon, with the objects of protecting maintaining, and advancing the interests of consumers of electricity and other forms of power in Great Britain and countries of the British Empire. The Association will be registered shortly with an authorised capital of £25,000. The members of the executive committee are Mr. R. C. Hawkin (chairman), Sir Cecil Partridge, Sir Stanley L. Johnson, Mr. A. F. Pool, and Ald. G. A. Lansdown. The intention of the Association is to make every effort to reduce the charges for electricity to a universal level. It will appoint a Parliamentary committee for the purpose of bringing to the notice of M.P.s the many anomalies in the charges to consumers, and the Association hopes in due course to promote a Bill in Parliament.

Hire-purchase of Refrigerators at Ealing

Ealing Corporation Electricity Supply Department is doing its bit towards popularising the electric refrigerator and has just introduced a new scale of hire-purchase terms with rates as low as 1s. 9d. a week. The quarterly payments may be spread over periods of one, two, three or five years, and five models are available, Westinghouse D35 and D42, and Electrolux LDA, LDB, and LJK. With payments over five years the Electrolux LDA may be obtained for 22s. 6d. a quarter, and there are correspondingly low charges for the larger models. No deposit is required and every machine carries a five years' guarantee.

Trade Announcements

Mr. G. E. Whitehead has taken over a factory at Windsor Works, Ferry Road, Cardiff, under the name of Whitehead Switchgear, Ltd., to manufacture inventions in connection with switchgear and starting equipment.

Ensign Lamps, Ltd., has opened a branch depôt at Albert Place, Bridge Street, Manchester (telephone: Blackfriars 7599), and Mr. A. Porter has been appointed manager. Arrangements are being made to open a depôt in Birmingham.

Messrs. Brown Bros., Ltd., inform us that they have acquired the business of Messrs. F. B. Icke & Co., Greyfriar Gate, Nottingham. Mr. A. S. Greaves will continue to manage the business.

Messrs. Lee & Burgess have closed their branch at 5, West Street, Fareham, Hants, and have opened a new branch at 7, High Street, Lee-on-Solent. The head office and works still remain at 145, West Street, Fareham.

On and from August 19th next the address of the Airedale Electrical and Manufacturing Co., Ltd., will be Delta Works, Low Moor, Bradford.

All-electric House at Sudbury

In the article appearing on page 77 last week the name of the company responsible for special modern fittings in the electric house was inaccurately given. The fittings were supplied by the Euston Manufacturing Co., Ltd., of 143B, Euston Road, N.W.1.

Works Visit

Members of the Empire Parliamentary Association Conference visited the Witton engineering works of the General Electric Co., Ltd., on July 18th and were accompanied by the Lord Mayor of Birmingham, Sir Howard D'Egville (secretary of the Organising Committee), and Mr. P. J. Hannon, M.P. On arrival at the works the guests were received by Dr. A. H. Railing, the director in charge of the Witton group of factories. The departments visited during the morning were the standard motor works, the main engineering works, the small motor works, and the high power test laboratory. In the main engineering works several large turbo-alternators were seen in course of construction, including two of 62,500-kVA for Birmingham Corporation, and two of 20,000-kVA for Johannesburg. Several machines in connection with electric winding plant for South Africa were also inspected. Lunch was served at the Magnet Club of the G.E.C., when Dr. A. H. Railing welcomed the guests. The Hon. N. K. Basu, C.I.E., member of the Council of State of India, responded on behalf of the guests, and the Lord Mayor of Birmingham also spoke. After lunch the tour of the works was continued, the departments visited including the battery works, the main switchgear works, the high-voltage works, and finally the high-voltage laboratory.

New Municipal Showrooms

The Skipton Town Council has secured premises at 79, High Street, Skipton, on a ten years' lease, for use as a central electricity office and showroom.

For Sale

The Bournemouth & Poole Electricity Supply Co., Ltd., has for disposal the complete equipment of a 20,000-kW generating station.

(See our classified advertisements.)

A Crompton switchgear demonstration van

Prices of Materials

Messrs. Frederick Smith & Co. report, July 24th: Electrolytic copper bars, £35 15s., 15s. increase. Ditto, ditto, wire rods, £41 15s., 15s. increase. Ditto, ditto, h.c. wire, 6 7/8d., 1/8d. increase. Silicium bronze wire, 7 7/8d., 1/8d. increase.

Messrs. Henry Gardner & Co., Ltd., report, July 24th: Copper bars (best selected), sheet and rod, £62, £2 increase. English pig lead, £17 5s., £1 5s. increase.

Messrs. Edward Till & Co. report, July 24th: India-rubber, Para fine, 4 1/2d., 1/2d. decrease.

New Catalogues and Lists

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.—An illustrated booklet on the electric propulsion of tugs, with particular reference to plant manufactured by the company.

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, E.C.4.—A pamphlet describing and illustrating Sturtevant unit heating, and a booklet relating to the plenum system of factory heating and ventilation.

George Cohen & Co., Ltd., 600, Commercial Road, E.14.—A sixty-page catalogue of second-hand machine tools.

The Walker Fender Co., Ltd., Despatch Works, Sherborne Street, Ladywood, Birmingham.—An illustrated and priced list of "Walkerite" electric table and floor lamps.

Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex.—A leaflet giving instructions for using appliance plug suppressor, type 1212.

British Insulated Cables, Ltd., Prescot, Lancs.—A folder (P.F.175) drawing attention to "Jaydalene" soldering paste.

H. Hacker & Sons, Perfecta Works, Ray Lea Road, Maidenhead.—A leaflet giving brief particulars of the new range of "Dynatron" high fidelity radio-gramophones and receivers.

S. Wolf & Co., Ltd., Pioneer Works, Hanger Lane, Ealing, W.5.—The fourth edition of the company's catalogue of electric tools, fully illustrated and priced.

Midgley Harmer, Ltd., Dukes Road, Western Avenue, W.3.—A pamphlet giving particulars of a new condenser microphone.

Arrow Electric Switches, Ltd., Hanger Lane, Ealing, W.5.—Catalogue F, containing illustrated particulars of a number of new switches and devices which the company has added to its range of products.

Kryn & Lahy (1928), Ltd., Coborn Works, Letchworth.—A well-produced brochure describing and illustrating the works of the company and its associated company, J. Browett Lindley (1931), Ltd., and also containing illustrations of some typical installations of steam engines, compressors and condensing plant.

Harold Ashton, Bull's Head Passage, Market Place, Manchester.—A pamphlet drawing attention to the Ashton air purifier and deodoriser.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.—A well-produced and illustrated brochure giving details of the outstanding features of the company's new range of receivers, a number of pamphlets containing technical specifications of

various receivers, and also particulars of hire-purchase schemes together with a hire-purchase agreement form.

O. N. Beck, 11, Queen Victoria Street, E.C.4.—A leaflet describing cable manhole ventilators, made by the Coppus Engineering Corporation, Worcester, Mass., for which Mr. Beck is the sole British agent.

Batteries, Ltd., Hunt End Works, Redditch.—List No. 935 dealing with the use of "Nife," nickel cadmium alkaline cells for Diesel engine starting.

Bankruptcy Proceedings

R. C. V. Radeglia, electric lamp dealer, 40, King William Street, E.C.—An application was made on behalf of this debtor on July 16th to Mr. Registrar Mellor at the London Bankruptcy Court for an order of discharge from bankruptcy proceedings instituted in February last by N. V. Vereenigde Industrieen, of Rotterdam. Mr. T. C. Cadwgan, Assistant Official Receiver, reported that in 1919 the debtor and another person formed Southwark Lighting Co., Ltd., to act as selling agents for the petitioning creditors, who were electric lamp manufacturers in Holland. In 1922 the debtor discovered that the lamps supplied infringed a patent and the Southwark Lighting Co. was discontinued and the Anti-Vibration Electric Lamp Co., Ltd., was formed to take over the agency, the debtor being again appointed director at £500 a year. During 1930 and 1931 it came to the debtor's knowledge that the V.I.R. Co. had sent lamps to this country other than through the Anti-Vibration Electric Lamp Company's agency. He regarded that as a breach of his agreement with the V.I.R. Co. and protracted litigation followed. A compromise was effected in June, 1934, but subsequently the V.I.R. Co. instituted further proceedings and obtained judgment by default for £325 in October, 1934, upon which claim these bankruptcy proceedings were founded. The debtor attributed his insolvency to guarantees given on behalf of his company and to excess of expenditure over income. The Official Receiver opposed the application on the grounds of (1) insufficiency of assets to equal 10s. in the £ on the amount of the unsecured debts; (2) contracting debts provable in bankruptcy without having reasonable or probable ground of expectation of being able to pay them; (3) contributing to the bankruptcy by unjustifiable extravagance in living. Mr. W. B. Frampton appeared for the petitioning creditors, who also opposed the discharge. After hearing Mr. T. F. Turner for the debtor, the Registrar upheld the Official Receiver's report but rejected the allegations of the petitioning creditors. It would be sufficient to suspend the discharge for three months. Order entered accordingly.

C. Marquis, wireless dealer, 9, Farringdon Avenue, and lately 55, Farringdon Road, Clerkenwell, E.C.—An application was made on July 19th to Mr. Registrar Mellor at the London Bankruptcy Court for an order of discharge on behalf of this debtor, who failed in November, 1932. The application was opposed by the Official Receiver on statutory grounds, and the discharge was suspended for one year.

N. P. Clark, Hastingwood Place, Harlow, Essex, electrical dealer.—The first meeting of creditors was held at the offices of the Official Receiver, 29, Russell Square, London, W.C., on July 19th, when the case being a summary one was left in the hands of the Official Receiver as trustee.

Electrical Supply Stores, electrical dealers, 36-37, Merchant Street, Bristol.—Receiving order made July 15th on a creditor's petition. First meeting July 29th at 2f, Baldwin Street, Bristol. Public examination September 27th at the Guildhall, Bristol.

J. Robertson, 68, Arran Road, Catford, S.E.—Last day for receiving proofs for dividend August 2nd. Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C., Official Receiver.

E. G. Williams, wireless and electrical dealer, 37, High Street, Brownhills, near Walsall.—Last day for receiving proofs for dividend August 3rd. Trustee, Mr. C. Hoult, 159, Great Charles Street, Birmingham, Official Receiver.

F. C. Blake, wireless dealer, 6, Berkeley Road, Tunbridge Wells.—Receiving order made July 10th on a creditor's petition. Public examination September 25th at the Town Hall, Tunbridge Wells.

H. Barker (Broadway Radio Stores), 848, Manchester Road, Bradford.—Application for discharge to be heard on August 9th at the County Court, Bradford.

J. Holder, electrical engineer, 31, Denehurst Gardens, Richmond, Surrey.—Application for discharge to be heard on September 27th at the Court House, Garratt Lane, Wandsworth, S.W.

E. C. G. Hofti, electrician, 10, Dean Road, Scarborough.—Order for discharge dated February 6th, 1934, annulled on June 25th last for failure to comply with judgment entered against him by the Official Receiver on February 19th, 1934.

H. C. Bridgman, electrical engineer, 37, Canynge Road, Clifton, Bristol.—Receiving order made July 18th on debtor's own petition. First meeting August 1st at 25, Baldwin Street, Bristol. Public examination September 1st at the Guildhall, Bristol.

G. A. Glazebrook (Coventry Electrical and Wireless Supplies), 27a, Victoria Street, Coventry.—Trustee, Mr. C. J. Band, 9-11, High Street, Coventry, Official Receiver, released July 12th.

Company Liquidations

Alfred Wiseman, Ltd.—Meeting August 26th at Midland Chambers, Warwick Passage, Corporation Street, Birmingham, to receive an account of the winding-up by the liquidators, Messrs. F. E. Bendall and W. J. Edwards.

H. G. Weaver, Ltd.—Winding up voluntarily. Liquidator, Mr. A. Collins, 28, Baldwin Street, Bristol.

Dissolution of Partnership

Hawkins & Hunter, electrical engineers, contractors and wireless engineers, 125, Wallasey Village, Wallasey, and 20, St. John's Lane, Liverpool.—Messrs. A. Hawkins and F. R. Hunter, have dissolved partnership. All amounts due in connection with the Wallasey business will be received by Mr. Hawkins, and those in connection with the Liverpool business by Mr. Hunter. Mr. Hawkins will meet all the liabilities and will carry on the business under the same name at 125, Wallasey Village.

Electricity Supply

Lighting, Domestic, Power

Barking.—ANOTHER LARGE INCREASE.—Sales of electricity increased by 2,802,569 kWh in the past financial year as compared with an advance of 2,789,633 kWh in the previous year. In his annual report Mr. W. E. Kidner, the borough electrical engineer, notes that the increase in lighting (14.5 per cent.) is well above the average for the country, and that the growth in the domestic rate load (57.2 per cent.) is a very satisfactory indication of the popularity of this tariff. The higher power consumption (14.2 per cent.), he says, reflects trade improvement rather than the connection of additional large consumers, while the abnormal increase in energy sold for traction purposes (67.5 per cent.) resulted from negotiations with the London Passenger Transport Board. An increase of 33 per cent. in the public lighting consumption was due to the recent improvements in this direction. Mr. Kidner recalls that the 32.5 per cent. expansion in sales last year gave the undertaking seventh place in the ranking of such increases for the municipal undertakings of the country, and he anticipates that the 24.8 per cent. improvement this year will again place Barking in a favourable position.

Barrow-in-Furness.—RECIPROCAL SUPPLY.—The Electricity Committee is to discuss the question of reciprocal electricity supply between Messrs. Vickers-Armstrong, Ltd., and the Corporation.

Bedford.—EXTENSIONS.—Mains are to be extended by the Electricity Committee to Potton (30 houses); Chalton; Mile Road estate (140 houses); Haynes; and Kempston (42 houses). The total cost of the extensions is estimated at £4,254.

LOAN.—Sanction is being sought to borrow £27,000 for apparatus and wiring installations.

Bristol.—LOAN FOR DOMESTIC APPLIANCES.—To meet the estimated cost of purchasing domestic appliances during the next three years, the Electricity Committee has made application for sanction to a loan of £240,000.

Bromley (Kent).—DISTRIBUTION EXTENSIONS.—Mr. W. G. Trend, borough electrical engineer, reports that very considerable additions were made to the mains network during the year to March 31st last. The Department laid the following mileage of cable: L.v., 12.9; h.v., 6.87; pilot, 3.91; and service, 13.6, a total of 37.28 miles. Recently the Department agreed to afford a supply to the L.C.C. Downham estate within the borough, and about 500 houses will shortly be connected, the wiring being carried out by the London County Council. A supply is also to be provided at the Turpington estate, and the work of laying the mains and wiring the houses is being put in hand.

Chester.—CHANGE-OVER.—The Electricity Committee is seeking sanction to borrow £5,000 for apparatus to complete the change-over scheme.

Clacton-on-Sea.—A POPULAR TARIFF.—Consumption of electricity under the domestic rate increased by 53 per cent. during the year.

REDUCED CHARGES FOR ELECTRICITY.—The Urban District Council has reduced the charge for lighting from 6d. to 5½d. per kWh for the first 750 kWh per quarter—and from 5½d. to 4½d. per kWh beyond; and for prepayment meters from 7d. to 6½d. per kWh. On the domestic tariff the fixed charge per annum of the net rateable value has been reduced from 12½ per cent. to 10 per cent.

Cleethorpes.—A GOOD RECORD.—No trouble was experienced with the plant or mains of the Electricity Department during the past financial year, and a supply is now available in practically any part of the area. Consumption increased by 37 per cent. and the number of consumers by 20 per cent., which bears out the conviction of Mr. B. S. Lord, electrical engineer and manager, that the public is becoming more electrically minded.

Croydon.—EXTENSIONS.—The County of London Electric Supply Co., Ltd., is to extend cables in Shirley Way, Addington, at a cost of £1,069.

IMPROVED LIGHTING.—In view of the proposal of the Transport Board to substitute trolley vehicles for the trams at West Croydon, the Electricity Committee has decided to improve the street lighting by "Osira" lamps at a cost of £1,848.

DISTRIBUTION.—The Electricity Committee is to extend mains at a cost of £4,970.

Dartford.—EXTENSIONS.—A supply is to be provided by the Electricity Committee to the Heath Farm estate and to sand and gravel pits at Crayford.

Earby.—ELECTRICAL APPLIANCES.—A hire-purchase scheme for electrical radiators, electric irons, washing machines, etc., has been put into operation, two local firms acting as agents for the local authority. The Council is empowered to utilise £600 to finance the scheme.

Halifax.—SWIMMING POOL ILLUMINATION.—Consideration is being given to a scheme for the construction of an open-air swimming pool, at a cost of £14,500. It is proposed that the pool shall be floodlighted at night, and also that under-water lighting shall be provided.

Hastings.—FLOODLIGHTING THE SEA.—The popularity of night bathing has induced the Corporation to arrange for a wide stretch of the sea and beach to be floodlighted at night.

Hawarden.—SUPPLY PROJECTS.—The Rural District Council is about to proceed with an extension of the supply to the Cymmau area, and with an alternative supply to the Saltney area.

Hazel Slade (Staffs).—RAPID ELECTRIFICATION.—During the past financial year the village was provided with a supply of electricity by the Cannock Electricity Department, and at the end of March last 76 per cent. of the houses were connected to the mains.

Horsham.—A YEAR OF PROGRESS.—We have recently received a copy of the 1933-34 accounts and reports of the Urban District Council, including those of the borough electrical engineer (Mr. F. Ffrench) who describes the period as an exceedingly busy and eventful one. The total sales of the Department rose by 21 per cent. to 2,306,249 kWh, gross revenue amounting to £26,569 (£24,012) and working costs to £14,307 (£14,219). The cost per kWh sold, including management expenses, rates, etc., was 1.49d. (1.79d.). After allowing for interest on loans, capital expenditure defrayed out of revenue and transfers to reserve and general rate funds, there was a net profit on the year's working of £3,111 (£3,244), bringing the balance in hand at the end of the period to £13,971 (£11,937).

Irish Free State.—ELECTRICAL DEVELOPMENT.—The report of the Electricity Supply Board for the year ended March 31st last shows that 18,461,000 more kWh was sold than in the previous year; the revenue increased by £108,707 to a total of £1,258,388; and 11,076 more people became consumers. The report adds that, before reaching any decision, or making any recommendations in regard to the hydro-electric development of the River Liffey, the Board deemed it desirable to obtain expert advice, and Professor E. Meyer-Peter and Dr. J. Buchi, of Zurich, had accordingly been consulted. To supplement the data already available, it was found necessary to make further observations and measurements, particularly of water conditions. The report of the experts is expected at an early date.

Kent.—LOWER "UNIT" CHARGES.—The running charge under the business and domestic two-part tariffs has been reduced to 1d. throughout the large rural areas supplied by the Kent Electric Power Co., the Sevenoaks & District Electricity Co., Ltd., and the South-East Kent Electric Power Co., Ltd., which are associated with the County of London Electric Supply Co. This follows the recent reduction to ¼d. per kWh in the inner London area and to ¾d. per kWh in the suburban areas.

London.—MODERN LIGHTING AT THE ZOO.—At the Zoological Gardens, Regent's Park, which remain open until 11 p.m. each Thursday during the summer months, there is to be seen the latest form of lighting employed in new surroundings and with excellent results. The nature of the illumination is such that it converts the enclosures and ponds into fairy-like settings. The lighting equipment consists of "Escura" electric-discharge lamps in six "Sirius" and "Saturn" lanterns, together with fifty projectors which are equipped with incandescent lamps, and the installation was carried out by the Edison Swan Electric Co., Ltd., in collaboration with Mr. Davolls, the chief engineer to the Zoological Society.

LEWISHAM.—The Borough Council has decided to contract with the South Metropolitan Electric Light & Power Co., Ltd., for the lighting of 3¼ miles of streets in Catford, Lee and Blackheath with the latest form of "Osira" electric-discharge lamps in place of the existing gas installations. This decision was arrived at after the Council had compared experimental installations of "Osira" lamps and the latest form of high-pressure gas lighting.

An aquatic scene at the Zoo during the illuminations

BATTERSEA.—The Electricity Committee is to erect a feeder pillar at Falcon Road at a cost of £196; lay a feeder to Wycliffe Road (£818); extend switchgear at Grayshott Road sub-station (£150); provide services at 100 premises (£848); extend mains in Blankarne Road (£147); and provide an extension to a new estate at St. John's Hill.

FULHAM.—Sanction has been obtained by the Electricity Committee to borrow £220,000 for extensions.

HACKNEY.—As a result of the activity of the Electricity Department in the hiring out of cookers, &c., most of the £10,000 allocated last October has been spent, and it is now recommended that a further £10,000 should be allowed for this purpose.

HAMMERSMITH.—The Electricity Committee is seeking sanction to borrow £3,267 for mains, £6,377 for services, and £10,475 for plant.

It is proposed to allow a 12½ per cent. rebate on consumers' accounts rather than completely revise the tariffs.

It was recently reported to the Electricity Committee that while the contractors were excavating for an underground substation at Abdale Road (one of four authorised last April) an appreciable amount of water was encountered. A subsidence occurred, and considerable damage was done to the works. The site had to be abandoned.

STOKE NEWINGTON.—The Electricity Committee has obtained sanction to borrow £3,029 for sub-station equipment, £1,669 for a supply to Clissold Court, and £5,000 for domestic apparatus for hire.

The Electricity Committee reports a net surplus for the year of £7,304.

Carrying a step further its policy of cheapening and popularising electricity in the home, the Electricity Committee recommends that energy for water-heating apparatus shall be charged at ½d. per kWh, subject to the reservation that such supplies shall be disconnected between the hours of 4 p.m. and 6 p.m. during November, December, January and February, and that the applicants shall use electricity for lighting. The Committee recommends letting immersion heaters on hire at quarterly rentals from 4s. to 6s.

Manchester.—A TARIFF REDUCTION.—The Electricity Committee recommends a reduction in the prepayment meter rate from 7d. to 6d. per kWh, inclusive of the cost of wiring under the assisting wiring scheme.

Northern Ireland.—NEW ACT.—It was announced in the Northern Parliament last week that the Royal Assent has been given to the Electricity Supply Bill.

Oldham.—CONCESSIONS.—Having made a net profit of £25,180 on its operations during 1934-35, the Electricity Committee has recommended a series of reductions affecting domestic consumers, the low rate charge of the two-rate shop lighting tariff, and the "unit" charge of the maximum demand tariff.

Rawtenstall.—UNIT INCOME AND COSTS.—The 1934-35 abstract of accounts of the Electricity Department shows that during the year 16,984,831 kWh was sold at an average price of 0.869d. per kWh, compared with 15,563,183 kWh at 0.910d. in the previous year. The total costs amounted to 0.800d. per kWh (against 0.840d.).

Richmond (Yorks).—TARIFF REDUCTIONS.—The Town Council is to reduce the charge for lighting from 5d. to 4½d. per kWh as from October 1st, and the scale of charges on the two-part tariff by 10s. per annum.

Skipton (Yorkshire).—REVISED CHARGES.—The Urban District Council has approved reduced charges to electricity consumers, following a successful year's operation by the Electricity Department. As from October 1st next the "unit" charge in respect of the all-in tariff for private dwelling houses will be ½d. per kWh; flat rate for industrial purposes on the maximum demand system, from 3d./½d. per kWh, exclusive of meter rent; and street lighting, 1d. per kWh. There is to be a new all-in tariff for business premises or business premises with houses attached under which the first 200 kWh per kW of maximum demand per quarter will be charged at 6d. per kWh, and all in excess at 3d. per kWh.

South Africa.—KROONSTAD.—The new electricity supply scheme for Kroonstad, Orange Free State, which has cost £60,000, was inaugurated recently. A change has been made from d.c. to a.c.

Southampton.—EASTLEIGH FEEDER.—The Town Council has approved a scheme for a new h.v. feeder to Eastleigh, *via* Woolston, at a cost of £32,055.

Southend-on-Sea.—LOANS.—The Town Council has applied for loans of £50,000 for mains and services, £20,000 for adapting apparatus on consumers' premises, and £16,500 for meters and instruments.

Deposits by prepayment consumers are to be abolished as from the end of the year, the charge being amended to 8d. per kWh for the first 10 kWh and to 6d. per kWh beyond.

South Wales.—ACQUISITION OF UNDERTAKING.—The undertaking of the Glyntawe Electric Supply Company is to be acquired by the South Wales Electric Power Co.

Traction

Australia.—TROLLEY-BUSES.—The New South Wales Government is considering a proposal for the replacement of tramcars by trolley-buses in a number of congested streets in the Sydney and Newcastle areas. Inquiries have been made as to the possibility of constructing 200 trolley-buses locally. At present there are three trolley-buses operating as an experiment in Sydney, two of these being double-deck vehicles.

Edinburgh.—TRAMWAY REVENUE.—From its tramway services during the year to May 28th last Edinburgh Transport Department secured a revenue amounting to £800,839, providing a net surplus for the year of £17,266.

Glasgow.—RAILWAY ELECTRIFICATON.—The Corporation has written to the L.M.S. and the L.N.E. Railway Companies inviting their co-operation in obtaining financial guarantees for the electrification of the railways in the West of Scotland. The directors of both railway companies are asked to send representatives to confer with the Corporation with a view to joint action. Mr. Thomas Somers, the city engineer, is preparing a report on several routes which are suitable for electrification. These include the L.M.S. and L.N.E.R. underground lines which traverse the city, the L.M.S. "Cathcart Circle," which serves the southern suburbs, the Ayrshire routes, and the L.M.S. routes to Greenock and Wemyss Bay.

Leeds.—EXTENSION ORDER.—The Minister of Transport has made the Leeds Corporation Light Railways (Extension) Order, 1935.

London.—NEW TROLLEY-BUS SERVICES.—According to the *Daily Telegraph*, trolley-buses will have replaced trams by the end of the year on the routes from Woolwich to Dartford, *via* Bexley; Crystal Palace to Sutton, *via* Croydon; and Shepherd's Bush and Hammersmith to Hounslow and Hampton Court *via* Kew and Brentford.

BETHNAL GREEN FACILITIES.—In a report of the Law and General Purposes Committee it is stated that, as the proposed extension of the Central London Underground Railway may pass through the borough, the Committee is suggesting to the promoters that three stations should be provided, one in the centre of the district and others in the west and east.

STATION RECONSTRUCTION.—The London Passenger Transport Board is to rebuild the Sloane Square station of the District Railway.

Wolverhampton.—ANNUAL REPORT.—The gross revenue of the Corporation Transport Department (general manager and engineer, Mr. C. Owen Silvers) for the year ended March 31st last was £309,730, compared with £296,334 in the previous year. The revenue from trolley-buses was £245,928 (compared with £235,194), the remainder being from omnibuses. Working expenses were £164,664 (trolley-buses) and £58,525 (buses), leaving gross profits of £81,264 and £4,624 respectively. After meeting various charges the net surplus is £15,769, of which £5,000 is being allocated to the relief of rates and the remainder transferred to reserve. Passengers carried numbered 36,896,000 (34,216,000) by trolley-buses and 5,964,000 (5,287,000) by omnibuses, there being in operation at the end of the year 118 of the former and 50 of the latter. The average revenue per vehicle-mile was 15.132d. (trolley-buses), and 12.782d. (omnibuses). The trolley-bus is shown as slightly the faster of the two types of transport, the average speeds being 9.509 m.p.h. and 9.242 m.p.h. respectively.

Communications

Austria.—LARGE BROADCASTING HOUSE.—According to *World Radio*, the plans and designs for a new broadcasting house to be erected in Vienna are so extensive that a special public exhibition of them has been arranged. The cost of the building and equipment will be not less than £250,000, and the work will take nearly two years to complete. Provision is made in the plans for eighteen studios and fifteen other large rooms.

Germany.—FOREIGN ORDERS FOR WIRELESS STATIONS.—The Telefunken Co. has received two large orders from abroad, learns *Reuters Trade Service* from Berlin. A broadcasting station of 20 kW has been ordered for Norway, to be erected at Bergen. The new station will be one of the most powerful in Norway and should be ready for delivery in about seven months. The company has also received an order for a station of 1 kW for Peru, which will probably be erected at Lima.

Great Britain.—BROADCASTING INQUIRY.—The committee (chairman, Lord Ullswater) which is considering the future conditions of broadcasting in this country has concluded hearing the evidence, and is now considering its report.

POST OFFICE ORGANISATION.—Under a scheme which is to be tried in North-East England, a regional director (Lieut.-Col. T. P. Hobbins, at present surveyor of North-Eastern), with headquarters at Leeds, will be responsible for all post office services from Berwick to Lincoln and from the Pennines to the North Sea. His principal assistants will be functional experts in postal, telephone, telegraph, engineering, financial and personal administration, and they will constitute a Regional Post Office Board under his chairmanship. As a result of these changes the bulk of the matters now referred to London along ten channels of communication will in future be settled in Leeds. According to *The Times* this process of decentralisation and co-ordination is to be carried still further in the telephone service. In future there will be seven telephone managers (at Leeds, Bradford, Newcastle, Sheffield, York, Middlesbrough and Lincoln), each combining the functions and authority of the present district managers with those of the superintending engineers.

London.—NEW AUTOMATIC EXCHANGE.—Last Saturday the City telephone exchange, one of the largest in London, was changed over from manual to automatic working. The new equipment has been installed on the second floor of the Faraday Building, Queen Victoria Street, and it incorporates the latest developments in automatic switching plant.

MORE TELEPHONES.—At the end of June there were 525,871 subscribers' lines attached to exchanges in the area, representing an increase of 8.3 per cent. (over 40,000) during the year. The weekly increase in calls originated in the area was 11.9 per cent. (nearly 2,000,000).

Portugal.—INAUGURATION CEREMONY.—The new national station (*Emmissora Nacional*) is to be officially opened on August 1st.

Rumania.—NETWORK OF STUDIOS.—Studios are being built in every large town, according to a report in *World Radio*. These are to be connected by land lines, and when the network is completed in the autumn, programmes will be relayed from each town at least once a month.

Main Line Electrification in Hungary

IN the main-line electrification of the Hungarian State Railways, in which the system devised by the late Kalman de Kando has been adopted, the trolley wire is fed at 16-kV single-phase from a national three-phase 50-cycle transmission grid which supplies energy for general purposes. The original contracts were placed in April, 1931, supply and erection of the complete equipment for the four sub-stations being ordered from the Metropolitan-Vickers Electrical Co., Ltd., which also manufactured, as sub-contractor to Messrs. Ganz & Co., the pantographs, control equipments, and thirty 2,500-h.p. main traction motors, including four spares, for twenty-six locomotives. The first passenger locomotive began its trials on May 6th, 1932, and was put into regular passenger service on September 12th, 1932, and within the next twelve months it ran 86,048 miles. The second passenger locomotive and two freight locomotives followed in quick succession. Work on a further twenty-two locomotives (all of the passenger type for both services) was commenced in April, 1933, and completed in April, 1935. The total performance of the twenty-six locomotives up to the end of May has been 1,300,000 miles. They have been entirely successful in operation, although under the care of comparatively untrained personnel. In spite of the pronounced speed changes of the three-phase motors any desired intermediate speed can easily be obtained. Although the synchronous speed at the fourth stage is 62.1 m.p.h., the speed between Gyor and Hegyeshalom is limited to 52.8 miles per hour by simple adjustment of the so-called acceleration lever, and remains practically unchanged, only a few extra pints of water being evaporated in the starting resistance.

One of the Hungarian electric trains

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—State Electricity Commission of Victoria. September 16th. Compound filled switchgear and accessories. (T.Y. 5045.)*

Posts and Telegraph Department. August 27th. Condensers. (T.Y. 5082.)*

September 3rd. Motor-generators and rectifiers. (T.Y. 5083.)*

Beverley.—August 16th. Administrative County of York Higher Education Committee. Heating apparatus and electric lighting at new secondary school and headmaster's house. Specifications to be obtained from the Secretary, County Hall, by July 31st (deposit £3 3s. in each case).

Bridgwater.—July 30th. Town Council. Electrically driven centrifugal pumps with automatic control gear, crane, wiring and other works. Sandford, Fawcett & Partners, 53, Victoria Street, S.W.1. (deposit £5 5s.).

Cardiff.—July 30th. King Edward VII Welsh National Memorial Association. Steam-driven generating set at North Wales Sanatorium, near Denbigh. (July 19th.)

Clitheroe.—July 29th. Electricity Department. 3,000-kVA transformer. (July 19th.)

Dewsbury.—July 27th. Town Council. Meters, underground joint and disconnecting boxes, cables, meter boards, tubing and fittings, house service cut-outs, compound, &c. Borough electrical engineer, Bradford Road.

Dundee.—August 14th. Electricity Department. 6,600-V and 660-V cable. (See this issue.)

Dunoon.—July 30th. Town Council. Electrical work at housing scheme. W. Rodger, burgh engineer, Municipal Buildings (deposit £1 1s.).

Egypt.—September 10th. Mechanical and Electrical Department, Ministry of Public Works. Electrical pumping station complete with building work, machinery and accessories at Rasheed Drain. Chief inspecting engineer, Egyptian Government, 41, Tothill Street, S.W.1 (deposit £1 10s. 9d., not returnable).

CAIRO.—Ministry of the Interior. September 9th. Electrical network for Zagazig. (T.Y. 5049.)*

October 3rd. Electrical equipment required in connection with the erection of a sub-station at Mehella-el-Kobra. (T.Y. 5084.)*

Epsom and Ewell.—August 8th. Electricity Department. One e.h.p. truck type cubicle, modifications to existing switchgear and l.p. cable. (See this issue.)

Glasgow.—August 3rd. Corporation. Electrically operated passenger and goods lift at Art Galleries, Kelvingrove. Office of Public Works, City Chambers (Room 81).

September 10th. Electricity Department. Turbo-alternator plant and boiler house plant and buildings. (See this issue.)

Haslemere.—August 3rd. U.D.C. Electric lighting in sixteen houses. (July 19th.)

Hastings.—August 8th. Electricity Department. Switch and transformer kiosk. (See this issue.)

Hemel Hempstead.—August 12th. R.D.C. Improving the existing pumping machinery at the Flamstead waterworks by the provision of a new set of small pumps with automatic electric control and other works. T. H. Lightbody, surveyor, Broadway Offices.

Honley.—August 20th. Electricity Department. Automatic voltage regulation transformer. (See this issue.)

Hull.—July 31st. Transport Department. Equipment for new garage at Ferensway, including portable electric welding machine, cranes, cylinder boring and milling machines, &c. D. P. Morrison, general manager, Transport Offices, Albion Street.

India.—SIMLA.—Stores Department. August 6th. Annual supply of welding electrodes for the railways. (T.Y. 5051.)*

August 13th. Twelve months' supply of insulating tapes and varnishes. (T.Y. 5080.)*

Irish Free State.—DUBLIN.—August 23rd. Electricity Supply Board. 38,000-V switchgear equipment for a new indoor station and control room equipment for Pigeon House station. (July 19th.)

Lancaster.—August 12th. R.D.C. Electrically operated automatic sewage plant for the Slyne-with-Hest sewerage scheme. H. B. Ward, 26, North John Street, Liverpool (deposit £5 5s.).

Leeds.—August 20th. Electricity Department. 30,000-kW turbo-alternator and exciter surface condensing plant, and other accessories. (July 19th.)

Leyton.—August 9th. Electricity Department. Transformers, e.h.p. and l.p. switchgear, motors, and rectifier units for radio receivers. (See this issue.)

London.—FULHAM.—August 12th. Borough Council. Transformers. (July 19th.)

New Zealand.—WELLINGTON.—Public Works Tenders Board. October 8th. 1,500-kVA transformer. (A.Y. 13167.)*

October 22nd. Oil-immersed 11,000-V solenoid-operated circuit-breaker. (T.Y. 5062.)*

Post and Telegraph Department. September 18th. Telephone instrument cords. (T.Y. 5058.)*

September 19th. Condensers. (T.Y. 5060.)*

Northern Ireland.—BELFAST.—August 3rd. Electricity Department. Indoor type armour-clad switchgear and extensions to coal-handling plant and chlorinating plant at the Harbour power station. (July 12th.)

LISBURN AND BELFAST.—August 17th. Regional Education Committee. Electric lighting and l.p. hot-water heating installations at new public elementary school. R. Ferguson, architect, 36, Scottish Provident Buildings, Belfast.

St. Helens.—September 2nd. Corporation. Stoneware ducts and cable protection tiles. (July 19th.)

Scarborough.—July 31st. Electricity Department. Battery-electric delivery van. (July 19th.)

Sheffield.—August 15th. Electricity Department. Six 500-kVA transformers. (See this issue.)

South Africa.—PRETORIA.—Union Tenders and Supplies Board. August 9th. Telephone and telegraph line material. (T.Y. 5025.)*

CAPE TOWN.—Electricity Department. August 14th. P.i., impregnated, l.s., s.t.a. and waterproofed cables. (T.Y. 5036.)*

Sunderland.—August 19th. Electricity Department. Cookers, water heaters, wash-boilers and irons. (See this issue.)

Sutton Coldfield.—July 26th. Electricity Department. Kiosk sub-station, with distribution panel and 300-kVA transformer. (July 19th.)

Taunton.—August 26th. Electricity Department. Electric lighting installations in small dwellings. A. J. Howard, borough electrical engineer, 1, St. James's Street.

Uruguay.—MONTEVIDEO.—State Electricity Supply and Telephones Administration. August 23rd. Meters and spares. (T.Y. 5033.)*

August 31st. P.i., l.c. and armoured cable with joint boxes and accessories. (T.Y. 5063.)*

September 16th. H. and l.p. cables. (T.Y. 5065.)*

Wick.—August 3rd. Town Council. Electric lighting at housing schemes. Burgh surveyor (deposit £2 2s.).

Wrexham.—August 2nd. Electricity Department. Transformers and e.h.p. switch cubicle. (July 19th.)

---

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Ashton-under-Lyne.—Town Council. Accepted. Electric lighting at 178 houses and twelve flats on the Lees Road and Ladbrooke Road estates.—R. McDermott.

Australia.—NEW SOUTH WALES.—Public Works Department. Accepted. X-ray apparatus at Wyalong District hospital (£594).—Philips Lamps (A'sia), Ltd.

BRISBANE.—City Council. Accepted. L.c. and armoured cable (£6,013) and eighty-six boxes with materials (£515).—Enfield Cable Works (Aust.), Ltd. L.c. and armoured cable (£6,317).—W. T. Henley's Telegraph Works Co., Ltd.—*Tenders.*

Bedford.—Electricity Committee. Recommended. Two voltage regulators (£621).—C. A. Parsons & Co., Ltd.

Bradford.—Education Committee. Accepted. Electric lighting at Haworth Road School (£179).—J. Carter.

Electricity Committee. Accepted. 500-kW mercury arc rectifier at Thornbury sub-station.—Metropolitan-Vickers Electrical Co., Ltd.

Croydon.—Health Committee. Recommended. Fire alarm system at the sanatorium (£119).—Walters Electrical Manufacturing Co., Ltd.

Dartford.—Electricity Committee. Recommended. 160 slot meters for Council houses.—R. Hornby & Co., Ltd. Electricity showroom signs.—Claude-General Neon Lights, Ltd. Transformer and equipment (£395).—Crompton Parkinson, Ltd.

Grimsby.—Electricity Committee. Recommended. Oil filtration plant (£194).—Metafiltration Co., Ltd. Switchgear.—Metropolitan-Vickers Electrical Co., Ltd. (£835); A. Reyrolle & Co., Ltd. (£880). Cables for supply to Fotherby and Binbrook (£3,840).—Johnson & Phillips, Ltd.

Inverness.—Town Council. Accepted. Electric lighting at the baths (£405).—Lind Davidson.

London.—BATTERSEA.—Electricity Committee. Recommended. Two feeder switches (£710).—Switchgear & Cowans, Ltd.

CITY CORPORATION. Cattle Markets Committee. Recommended. Electric lighting at Cattle Market: General Installation (£1,220).—W. J. Furze & Co. (London), Ltd. Lanterns and standards (£368).—British Thomson-Houston Co., Ltd.

HACKNEY.—Works Committee. Recommended. Nineteen electrically propelled vehicles including re-crating existing "Britannia" and "Exide" batteries and supplying new "Exide" batteries (£14,894).—Electricars, Ltd.

HAMMERSMITH.—L.C.C. Accepted. Electric lighting at Stamford House Remand Home (£1,238).—Twentyman & Willmott, Ltd. This was the lowest of fifteen tenders, the highest being £3,140.

ST. PANCRAS.—Contracts and Stores Committee. Recommended. P.i. cables for a period of one year commencing August 1st.—Hackbridge Cable Co., Ltd.; Metropolitan Electric Cable & Construction Co., Ltd.; Telegraph Construction & Maintenance Co., Ltd. Twelve months' supply of meter boards.—Thomas De Halle. Extension of h.p. switchgear at the Tavistock Place sub-station (£385).—A. Reyrolle & Co., Ltd.

WOOLWICH.—L.C.C. Accepted. Electrical renewals at Avery Hill training college (£2,105).—Barlow Bros. & Co. This was the lowest of eight tenders, the highest being £3,406.

Wimbledon.—Electricity Committee. Accepted. Feeder equipment with protective equipment and metering current transformers (£3,053).—A. Reyrolle & Co., Ltd. 33-kV cable for sub-stations at Wimbledon and Malden (£56,000).—British Insulated Cables, Ltd. Two 15,000-kVA Scott transformer groups (£12,600).—Hackbridge Electric Construction Co., Ltd.

Notes

The Electrical Research Association

The E.R.A. has recently extended its programme of research to include the following, on which the Director will be pleased to reply to inquiries:—Benzyl and ethyl cellulose films; maintained electric stress and tearing strength of cellulose acetate films; effect of oil on finishing air-drying insulating varnish; deformation of synthetic-resin bonded-paper sheets; use of the Barthel burner in testing non-ignitable and self-extinguishing boards; thermal resistivity of varnished cambric insulated cables; damage to cables in ducts due to temperature change; stress distribution in steel-cored aluminium conductors; verification of strength and factor of safety of concrete poles to B.S.S. No. 607; behaviour of self-extinguishing (ignitable) dielectrics; and the improvement of silicon steel.

Electric Punkahs in India

One hundred and twenty-five electric fans in the barracks of Fort St. George, Madras, are to be replaced by a series of small punkahs driven by eight 2-h.p. electric motors. The punkahs will be connected by steel wires and so suspended that at night they may be lowered so that their fringes are about a foot above the beds—a measure intended to cope with the mosquito nuisance. A considerable saving of Rs.6,000 per annum in the consumption of electricity is anticipated.

Technical College Buildings and Equipment

A report on the planning and equipment of technical school buildings has been prepared by a joint committee of the Association of Technical Institutions and the Association of Principals of Technical Institutions, the Royal Institute of British Architects, the Institute of Builders, and the Board of Education. This instructive publication of 164 pages with a bibliography and plans and photographs of college buildings recently erected at home and abroad should be informative to local education authorities contemplating new buildings of this kind. Copies are obtainable for 3s. each, post free, from the Chelsea Polytechnic, Manresa Rd., London, S.W.3. Advice is offered on electric heating by low-pressure hot water, surface panels, and tubular units; and on the provision of electric power and artificial lighting, the minimum intensities of illumination recommended for various purposes being stated. Regarding the equipment of departmental rooms it is recommended that for domestic science demonstrations both gas and electric cookers should be provided as well as refrigerators. All machine tools in the workshops should have individual drives with master control pushes on the walls in addition to starting and stopping gear on each machine. The provision of arc-welding equipment is mentioned. The general and detailed requirements of the electrical engineering laboratory are briefly specified. Every department of electrical engineering will require a repair workshop of its own.

The Institute of Physics

The board of the Institute of Physics, at the request of a number of members resident in the Midlands, has created a local section of the Institute in the Midland area. The districts represented by the application are Birmingham, Leicester, Nottingham and Rugby. It is intended to hold the inaugural meeting early in October, probably in Birmingham. Further information may be obtained from Dr. J. H. Mitchell, Research Laboratory, the British Thomson-Houston Co., Ltd., Rugby.

Fatality

An inquest was held on July 16 at Matlock on Wilfred Shaw (24) who was killed while renewing fuses on an overhead line. The fuses had been blown by lightning earlier in the day and Shaw had just replaced them when the supply was restored, and he received a fatal shock.

Another man who was burned, W. Ridge, was brought into court on a stretcher. He said that they had just completed the work when he felt a shock and became unconscious. He recovered and found himself hanging by his safety belt, which he unfastened, and fell to the ground. A. Bowler said he remained on the ground, while Shaw and Ridge were doing their work. He heard Ridge groan; Shaw reached out to him and immediately received a shock.

E. Johnson said that when he found the power off at both his house and flour mill he went to the mill distribution board. He took the fuses from one supply one by one and put them in the other circuit. He had done this once before and nothing happened. Replying to the Coroner, Johnson said the fuses were sealed when they were first put in, but they had not been sealed for some time. He had no idea who removed the seals, and he did not know he was making the Matlock lines "live." E. Crich, lines superintendent to the Derbyshire and Notts Power Co., said there was an alternative supply at Johnson's mill, but no one except the company's men were authorised to interfere with it. The fuses were sealed, and the supply could not be interfered with unless the seals were broken.

The Coroner said that Johnson had no doubt acted innocently, but he was lacking in ordinary common-sense to do what he had done. The question arose as to whether the power company had done anything to ensure safety in view of the enormous possibility of danger, but that was a matter which the company and the appropriate Government Department would no doubt take up. The jury returned a verdict in accordance with the evidence and expressed the view that cut-outs on consumers' premises were not satisfactorily safeguarded against tampering.

Institute of Metals Conference

This year's annual autumn meeting of the Institute of Metals will be held in Newcastle-upon-Tyne from September 9th to 12th, under the chairmanship of Dr. Harold Moore, president of the Institute. The proceedings will begin on the evening of September 9th with the delivery by Dr. H. W. Brownsdon of the 14th autumn lecture on "Metal Melting—Its Effect on Quality." On September 10th there will be a civic welcome by the Lord Mayor of Newcastle-upon-Tyne and discussions on a series of scientific papers relating to various phases of metallurgical work. In the afternoon parties will be formed to visit works of metallurgical and engineering interest, and in the evening there will be a civic reception and dance. On September 11th the morning will be devoted to the discussion of further papers, the afternoon to works visits and the evening to a dinner at the Royal Station Hotel. An all-day motor trip on September 12th to the Roman Wall and Fort at Borcovicus will conclude the conference.

Light Culture in Hothouses

The effect of the sun in Russia is inadequate between November and February to provide normal growth of such plants as tomatoes and cucumbers, and it is not until March that sufficient natural light is obtained for this purpose. According to *Elektrifikatsin Selckovo Hozaectva*, experiments have shown that the production from naturally illuminated hothouses bears a definite relation to the hours of light, and that intensified illumination gives proportionately higher yields. By additional artificial light normal growth can be secured throughout the year. In order to arrive at the correct light intensity a careful check was made on the natural diffused light intensity received by normally growing plants during the summer. This was found to be 15,000 lux (lux= flux density of 1 lumen to 1 sq. metre). In the winter months the natural light intensity falls to between 2,000 and 4,000 lux. Only 22 per cent. of the rays are from orange to red (those active in the assimilation of carbon dioxide) most of the light comprising blue and violet rays which are of little value in promoting growth. This deficiency in red rays is provided artificially.

Consideration has been given to (a) arc lamps, (b) quartz mercury-vapour lamps, and (c) tungsten lamps. In first cost and space needed the tungsten lamp is preferable, in addition to which its spectrum is suitable for providing the additional rays required. The intensity of artificial lighting is from 10,000 to 12,000 lux, requiring 500 to 750 W per sq. metre. The lamps of 500 or 1,000 W are placed 35 to 40 cm. from the plants, and are suspended on chains so as to be raised with the growth of the plants. The humidity of the soil is maintained at approximately 80 per cent. and the day and night temperatures are 18 deg. to 28 deg. C. and 15 deg. to 28 deg. C., respectively. In an experiment sowing took place on November 18th, and the first signs of growth were observed on November 28th. Sprouting stage was reached on December 15th, and after eighty days from sowing, ripe tomatoes were gathered. This represents, roughly, twenty-eight days in advance of normal growth. The cucumber crop is ready about one month earlier under artificial light. The cost of equipment is reckoned at £6 (one rouble=3s.) per sq. metre of hothouse area, and the life of the equipment is estimated at ten years. Electrical energy to produce tomatoes in the early spring amounts to approximately 40 to 50 kWh per kilogramme of produce and costs from 5s. to 9s., depending upon the cost of electricity. The cost is based on a tariff of 1.44 to 2.16d. per kWh, which it is anticipated will be reduced ultimately to approximately 0.5d. per kWh.

Appointments Vacant

Examiners in the w.t. section for the Air Ministry (Aeronautical Inspection Directorate).

Assistant, grade III, and temporary assistant, grade II, in the Admiralty Technical Pool.

Installation inspector for Southend Electricity Department.

Lady demonstrator and showroom assistant for Hastings Electricity Department.

Technical assistant in L.C.C. Chief Engineer's Department.

Plumber jointer for Cheltenham Electricity Department.

Temporary assistant mechanical and electrical engineers for the Air Ministry.

(See our classified advertisements.)

Makers' Names Wanted

SOBRITE electrical fittings.

BARLUX architectural lamps.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Sir William Ray, executive chairman of the British Electrical Development Association, has been granted by the Council, on medical advice, three months' leave of absence on account of ill-health. Sir William has gone to the South of France to recuperate.

I.E.E. Scholarships.—The following scholarships have been awarded by the Institution of Electrical Engineers for 1935: Ferranti Scholarship, annual value £250, tenable for two years: Mr. C. H. W. Clark, M.Sc.(Eng.) (Queen Mary College, London). Duddell Scholarship, annual value £150, tenable for three years: Mr. D. J. G. Richards (Port Talbot County Schools). Silvanus Thompson Scholarship, annual value £100, plus tuition fees, tenable for two years: Mr. G. King (Callender's Cable and Construction Co., Ltd.). Swan Memorial Scholarship, annual value £120, tenable for one year: Mr. A. C. W. V. Clarke, B.Sc. (King's College, London). David Hughes Scholarship, value £100, tenable for one year: Mr. T. F. Monahan (Leeds University). Salomons Scholarships, value £50 each, tenable for one year: Messrs. C. G. Longford and J. E. Parton (Birmingham University). War Thanksgiving Education and Research Fund (No. 1): Grants of £50 each to Messrs. H. Barker (Leeds University), and W. E. Harper (Birmingham University). Paul Scholarship, annual value £50, tenable for two years: Mr. F. E. Burton (Regent Street Polytechnic, London). Thorrowgood Scholarship, annual value £25, tenable for two years: Mr. H. W. Hadaway (L.P.T.B.).

Mr. A. W. Allwood, B.Sc., who has been a member of the staff of the distribution department of the Torquay Corporation electricity undertaking for the past four years, has been appointed senior assistant mains engineer to the Norwich City electricity undertaking.

Mr. V. Watlington, who was appointed a director of the B.E.A.M.A. in 1932, and occupied that office, together with Mr. D. N. Dunlop, until the death of the latter in June, was on July 18th, at a Council meeting of the Association, invested with the entire control of the management of the organisation. Mr. C. Rodgers, who has been secretary of the Association since 1921, was at the same meeting appointed Deputy Director. As the industry knows, Mr. Watlington has been associated with the B.E.A.M.A. for many years; in the early days he contributed to the work of various sections and committees, and established a marked intimacy with the machinery of the body. In 1925 he was appointed a member of Council, and four years later was elected chairman, becoming a director in 1932 as already stated. He was for many years associated with electrical and other manufacturing companies, notably Dick Kerr & Co., Ltd., and later the English Electric Co., Ltd., of which he was managing director until he became a director of the B.E.A.M.A.

Mr. Rodgers was educated at Firth College, Sheffield, Sheffield Technical School, the City and Guilds Engineering College, and Zurich. He joined Siemens Bros., and was for some years chief a.c. designer, afterwards being engaged on administrative work at the head office. Since 1908 he has been actively connected with the work of the British Standards Institution and subsequently of the International Electrotechnical Commission. Both gentlemen are members of the I.E.E. Council.

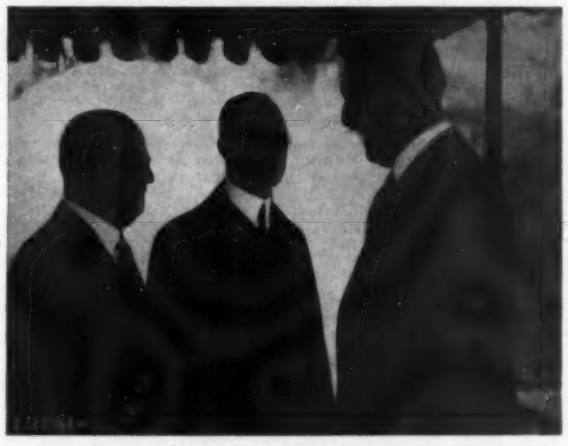
Mr. Rodgers has been active in B.E.A.M.A.'s affairs since its inception. Under the late Mr. Dunlop he was organising secretary of the first World Power Conference.

Mr. A. W. Williams

Mr. A. W. Williams was elected national president of the Association of Mining Electrical Engineers at the annual convention held in Nottingham last week. Mr. Williams, who is the son of a colliery manager, has had a wide experience of mining, having been connected with the industry for thirty years, and for a number of years in actual colliery employment. He was president of the Midland branch of the Association in 1921-22-23, and has held positions on most of the committees, having been a member of the Advisory Committee for ten years. He holds a number of patents, practically all of which are for the safety of the application of electricity at the coal face, including the Williams-Rowley system of earth circuit protection.

Mr. W. Taylor, who was until recently switchgear engineer with Brookhirst Switchgear, Ltd., has become chief engineer and manager of Whitehead Switchgear, Ltd., Cardiff.

Lord Hirst entertained sixty delegates of the Empire Parliamentary Association Conference from Dominion Parliaments at lunch at the Hopbine Hotel, Wembley, on July 15th, prior to a visit to the Research Laboratories of the General



Lord Hirst receiving his Empire Parliamentary Association guests

Electric Co., Ltd., in the afternoon. Our picture shows Lord Hirst greeting Sir Stanley Spurling, member of the Executive Council and secretary of the Bermuda branch of the Association. Later in the week the guests paid the visit to the G.E.C. works at Witton reported on p. 125.

The scrutineers appointed by the Institution of Electrical Engineers have announced the result of the ballot to fill the vacancies which will occur in the Council on September 30th next. The elections are as follows:—President: Mr. J. M. Kennedy. Vice-president: Mr. A. P. M. Fleming. Hon. treasurer: Mr. F. W. Crawter. Ordinary members of Council: Mr. E. S. Byng, Prof. C. L. Fortescue, and Mr. P. Good (members), and Mr. F. E. J. Ockenden (associate member). The nominations were recorded in our issue of June 7th, p. 841, when brief biographical notes were given.

Mr. C. W. Braithwaite has resigned from the board of the Southern Areas Electric Corporation.

Major H. C. Davis, Assoc.I.E.E., has resigned from the position of managing director of the Gradley Electrical Co., Ltd., and has commenced business on his own account as a consulting engineer at 39, Berners Street, W.1. He asks for manufacturers' catalogues.

Obituary

Mrs. E. E. Sharp.—It is with great regret that we learn of the death on Tuesday last of Mrs. Sharp, the wife of Mr. E. E. Sharp, of Venner Time Switches, Ltd. A large circle of friends in the electrical industry will join with us in offering Mr. Sharp our sincere condolences.

Mr. E. E. Cleaver, late of the Edison Swan Electric Co., died on July 10th after a short illness.

Mr. W. M. France.—The death occurred on July 20th at his home at Norwood, S.E., of Mr. William Masterman France, M.I.E.E., of the Engineer-in-Chief's Office, G.P.O.

Mr. G. W. Keats.—The death occurred at a village on the Norfolk Broads on July 7th of Mr. George William Keats, at the age of sixty. Mr. Keats retired on superannuation in May, 1931, from the position of borough electrical engineer at Woolwich, owing to ill health, having been in the service of the Borough Council for thirty-one years.

Ald. F. G. Howard.—The death is reported of Ald. Frank Geere Howard, which occurred on July 14th at his Hampstead home. At the age of twenty-one he went to Egypt, and while there superintended the installation of electric lighting in the palace of the Khedive. On returning to England he took an active part in the municipal affairs of Hampstead and served on all the committees, including the Electricity Committee, of which he was a member for three years. He was mayor of the borough during the years 1921-22, 1923-24, and 1924-25. From 1896 to 1923 he was associated with Messrs. Gillham & Jones, electrical engineers, and in the latter year retired from the electrical industry

Mr. H. Vaughan.—The death took place on July 17th, at the age of sixty-two, of Mr. Harry Vaughan, foreman cable jointer at the Chester Corporation electricity works, where he had been engaged since its inception in 1896.

Mr. J. F. Herd.—The death is announced of Mr. James Fleming Herd, M.I.E.E., of the Radio Research Station, Slough, which occurred on July 22nd at Bude, Cornwall.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Cables Investment Trust, Ltd.—Public company. Registered July 15th. Nominal capital: £4,000,000 in £10 shares (200,000 4½ per cent. cumulative redeemable preference, and 200,000 ordinary). Objects: To acquire part of the investments of Cable & Wireless (Holding), Ltd. The first directors are: J. C. D. Pender, 65, Eaton Place, S.W.1, Sir Basil P. Blackett, K.C.B., K.C.S.I., 9, Seymour Street, W.1, E. Wilshaw, J.P., F.C.I.S., Arundel House, Arundel Street, W.C. (directors of Cable & Wireless (Holding), Ltd.), C. E. Tavener, Murton House, Higham Road, Woodford Green. Registered office: Electra House, Victoria Embankment, W.C.2.

T.R.S. (Television Receiving Sets), Ltd.—Private company. Registered July 15th. Capital, £30,000 in £1 shares. Objects: To carry on the business of manufacturers and producers of and dealers in all kinds of apparatus, instruments and material used in connection with television, wireless telegraphy or telephony, &c. The subscribers are: E. J. Burrows, 29, Lyndhurst Road, Highams Park, E.4; and F. J. Groombridge, 110, Douglas Avenue, Walthamstow, E.17. Solicitors: Herbert Smith & Co., 62, London Wall, E.C.2.

Norman Clarke, Ltd.—Private company. Registered July 13th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical engineers, &c. The first director is N. L. Clarke, "Bournsted," Chestnut Drive, Berkhamsted, Herts. Registered office: 137, High Street, Berkhamsted, Herts.

Latona & Hall, Ltd.—Private company. Registered July 17th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical and general engineers, &c. The directors are: H. J. Baker (chairman), Offington Corner, Worthing, and two others.

Luton Wholesale Co., Ltd.—Private company. Registered July 16th. Capital, £100 in 5s. shares. Objects: To acquire the sole distributing rights in Bedfordshire and Hertfordshire of the Fenbo glareless lamp, &c., and to carry on the business of distributors and factors of, agents for and lealers in, lamps, general electrical appliances, &c. The directors are: E. Schweizer, Culverhouse Road, Luton, and R. A. Humphreys, 27, Conway Road, Luton. Registered office: 33, Williamson Street, Luton.

Realm Lighting, Ltd.—Private company. Registered July 15th. Capital, £2,000 in 950 6 per cent. cumulative preference and 950 preferred ordinary shares of £1 each and 2,000 founders' shares of 1s. each. Objects: To carry on the business of electrical contractors and floodlighting specialists, &c. The directors are: H. A. Reeves, 378, Watford Way, N.W.4, and T. R. Allen-Morgan, South Shoebury Hall, Shoeburyness. Registered office: 107, Charlotte Street, W.1.

International Broadcasting Co. (Continental), Ltd.—Private company. Registered July 15th. Nominal capital, £10,000 in £1 shares. Objects: To carry on business as wireless telegraphic, telephonic, general, mechanical and electrical engineers, manufacturers of and dealers in machinery and all requisites pertaining to broadcasting stations and transmissions and broadcasting generally, &c. The directors are: A. E. Leonard, 25, Portland Place, W.1, and L. F. Plugge, B.Sc., 98, Park Lane, W.1. Secretary: C. E. Newham. Registered office: 8, Duchess Street, W.1.

British Association of Radiologists, Ltd.—Private company. Registered July 17th. Capital, £100 in £1 shares. Objects: To carry out research work and market products for the application of electro-magnetic radiations, &c. The permanent directors are: B. J. Leggett and Mrs. A. E. B. Leggett, both of 353, Romford Road, E.7.

Electrotraction, Ltd.—Public company. Registered July 15th. Nominal capital: £100 in £1 shares. Objects: To carry on business as manufacturers and constructors of and dealers in electrically driven vehicles of all kinds. The subscribers are: G. T. Lloyd, 42, Hogarth Road, Earls Court, S.W.5; E. H. Saunders, 18, High Street, Windsor, solicitor, and five others. Solicitors: Thorp, Saunders & Thorp, 79, Salisbury House, London Wall, E.C.

John Biggs, Ltd.—Private company. Registered July 20th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electric light, power, gas and water engineers, lamp and turnstile manufacturers, manufacturers of and dealers in heating, lighting, ventilating and domestic appliances, &c. The directors are: B. W. Pharo, 33, Park Street, N.W.1, and A. V. Duncombe, 10, Hilbury Avenue, Kenton, Harrow, Middlesex.

Radio Experimental Products, Ltd.—Private company. Registered July 19th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio, telegraph, telephone, and television apparatus, &c. The directors are: H. J. Cleaver (managing director), 47, Northumberland Road, Coventry, and J. J. G. Cleaver, 47, Northumberland Road, Coventry. Registered office: Parkside, Coventry.

Henri's (Radio), Ltd.—Private company. Registered July 18th. Capital, £1,000 in £1 shares. Objects: To carry on the business of wireless apparatus and material manufacturers, manufacturers of and dealers in all kinds of electrical goods, &c. The directors are: L. Kahansky, 338, Mare Street, Hackney, E.8, and W. Lubelsky, 32, Woodberry Grove Road, Finsbury Park, N.4. Secretary: D. Lubelsky. Registered office: 26, Budge Row, Cannon Street, E.C.4.

Boyes Radio, Ltd.—Private company. Registered July 18th. Capital, £5,000 in £1 shares. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in wireless transmitting sets and receivers, &c. The subscribers are: M. Parker, 35, Durnsford Avenue, Wimbledon Park, S.W.16, and R. F. A. Tytler, 61, Dalmally Road, Addiscombe, Croydon. Registered office: 14, Suffolk Street, Pall Mall, S.W.1.

Returns of Electrical Companies

David Rowan (Vidro), Ltd.—The nominal capital has been increased by the addition of £2,500 beyond the registered capital of £5,000. The additional capital is divided into 2,500 6 per cent. cumulative preference shares of £1 each.

Bastian & Allen, Ltd.—Satisfaction in full on June 28th, 1935, of debenture dated November 19th, 1932, and registered December 7th, 1932. (According to the register of mortgages, the debenture registered December 7th, 1932, originally secured all moneys due or to become due to the holder not exceeding £5,000.)

L.R. Supply Co., Ltd.—Particulars filed of £500 debentures, authorised July 4th, 1935, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

Whitehall Electric Investments, Ltd.—Satisfaction in full on July 8th, 1935, of £3,500,000 6 per cent. 1st mortgage debenture stock has been registered. The stock was constituted as to £2,500,000 by trust deed dated April 13th, 1922, and as to £1,000,000 by supplemental trust deed dated June 20th, 1924, and was registered on April 27th, 1922, and June 25th, 1924, respectively.

Rayal Radio Co., Ltd.—Debenture dated May 15th, 1935, to secure £500 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Stephen A. Wood, Buckingham Road, South Woodford.

Broadmead Wireless Co., Ltd.—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £1,000.

Simpler Wireless, Ltd.—Capital, £1,250 in 1,000 preference shares of £1 each and 5,000 ordinary shares of 1s. Return dated December 31st, 1934 (filed April 30th, 1935). All shares taken up. £1,000 paid on the preference shares. £250 considered as paid on the ordinary shares. Mortgages and charges, nil.

Catford Radio, Ltd.—Capital, £100 in £1 shares. Return dated October 2nd, 1934 (filed April 23rd, 1935). All shares taken up. £100 paid. Mortgages and charges, nil.

Radio Hire Service, Ltd.—Mortgage on 36 agreements for the hiring of Philco wireless apparatus, dated June 14th, 1935, to secure £468. Holders: Sussex Finance Corporation, Ltd., 85, South Street, Eastbourne

R. O. Bridger & Co., Ltd.—Debenture dated July 4th, 1935, to secure £2,710, charged on the company's undertaking and assets, including uncalled capital. Holder: T. D. Bridger, "Sunnyside," Woolmer Green, Knebworth, Herts.

H. G. Cooper, Ltd.—Mortgage on 38, Herbert Road, Bexley Heath, dated July 10th, 1935, to secure £650 and any further advances. Holders: Bingley Building Society.

Bolton Electrical Traders, Ltd.—Satisfaction in full on July 6th, 1935, of debenture dated November 4th, 1933, and registered November 10th, 1933. (According to the register of mortgages, the debenture registered November 10th, 1933, originally secured all moneys due to bank.)

Butlers Radio, Ltd.—Satisfaction to the extent of £100 on June 29th, 1935, of two debentures dated March 7th, 1934, and registered March 16th, 1934.

Whitchurch (Hants) Gas & Electricity Co., Ltd.—Satisfaction on December 31st, 1934, and March 19th, 1935, (a) in full of debentures authorised December 1st, 1902, and registered January 9th, 1903, securing £4,000, (b) to the extent of £150 of debentures authorised December 19th, 1912, and (c) in full of prior lien debenture dated July 26th, 1928, and August 15th, 1928, securing £5,000.

British Battery Co., Ltd.—B. J. Andrews, 58, High Street, Watford, ceased to act as receiver or manager on June 15th, 1935.

Womersleys Electric Co., Ltd.—Capital, £1,000 in £1 shares. Return dated November 10th, 1934 (filed April 9th, 1935). 230 shares taken up. £230 paid. Mortgages and charges nil.

London Radio Co. (Leeds), Ltd.—Capital, £1,000 in £1 shares. Return dated November 3rd, 1934 (filed April 29th, 1935). All shares taken up. £20 paid, £980 considered as paid. Mortgages and charges: £2,000.

Matthews & Yates, Ltd.—Capital, £22,050 in 441 shares of £50 each. Return dated December 31st, 1934 (filed March 26th, 1935). All shares taken up. £6,000 paid, £16,050 considered as paid. Mortgages and charges: £20,000.

Banting & Tresilian, Ltd.—Capital, £1,000 in £1 shares. Return dated August 10th, 1934 (filed May 10th, 1935). All shares taken up. £1,000 paid. Mortgages and charges nil.

United Dominions Trust, Ltd.—The nominal capital has been increased by the addition of £250,000 in £1 ordinary shares beyond the registered capital of £750,000. Each of the existing 250,000 "B" shares of £2 has been sub-divided into two shares of £1 each which are to be known as 4½ per cent. cumulative preference shares.

Llanrwst Electricity Supply Co., Ltd.—Satisfaction to the extent of £3,500 (balance) on July 2nd, 1935, of debentures authorised March 29th, 1905, and registered April 11th, 1905.

Leamington & Warwick Electrical Co., Ltd.—Satisfaction to the extent of £35,000 on June 29th, 1935, of debentures authorised by resolutions of September 21st, 1906, and July 20th, 1908, and registered October 5th, 1908.

Cliffdown Appliances, Ltd. (formerly Cliffdown Electrical Appliances, Ltd.).—S. J. Bowyer, chartered accountant, of Bath

House, 57-60, Holborn Viaduct, E.C., was appointed receiver on June 29th, 1935, under powers contained in debentures dated January 30th, 1935, and March 16th, 1935.

Hill & Co. (Radio), Ltd.—Edwin Groom, of 728, Christchurch Road, Boscombe, Bournemouth, ceased to act as receiver and manager on July 16th, 1935.

Rosah, Ltd.—Samuel G. Crimes, of 150, Southampton Row, W.C.1, was appointed receiver and manager on July 16th, 1935, under powers contained in instrument dated July 24th, 1934.

Aberayron & District Electricity Supply & Power Co., Ltd.—Capital, £3,000 in £1 shares. Return dated May 26th, 1934 (filed April 12th, 1935). All shares taken up. £2 paid, £2,998 considered as paid. Mortgages and charges: £900.

Palmers Green Radio Service, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1934 (filed June 14th, 1935). Two shares taken up. £2 paid. Mortgages and charges nil.

Oliver Electrical Supplies Co., Ltd.—Capital, £100 in £1 shares. Return dated December 28th, 1934 (filed April 29th, 1935). 100 shares taken up. £100 paid. Mortgages and charges nil.

City Notes

The Victoria Falls and Transvaal Power Co., Ltd., held its annual meeting on July 17th, when Mr. A. E. Hadley (chairman and managing director), who presided, said that the increase in the tonnage of ore milled in the mines had resulted in 1,750,000,000 of "units" of electricity and compressed air being sold during the year under review, an average of 4,800,000 per day, which during the current year had risen to over 5,000,000 per day. Activity in the development of new properties and the extension of existing mines had also led to substantial notifications for further power. Under their contracts the prices charged were 5 per cent. lower than in 1933, when the revised contracts came into force. The agreement in substitution for the old agreement regarding the rights of the Victoria Falls had been executed by the Crown Agents for the Colonies, and they were now negotiating for the supply to Livingstone, for which, if satisfactory terms were arranged, suitable plant would be installed with provision for extension. Should the marked change in the position of the Colony due to the successful establishment of the copper industry in the north lead to activity in the vicinity of the Falls, they would be in a position to meet any demands. It was proposed to capitalise £1,500,000 from reserve and to issue to the ordinary shareholders 1,500,000 £1 ordinary shares in the ratio of three new shares to every two ordinary shares held. It was desirable to make the issued capital correspond more closely with the capital employed. At an extraordinary meeting which followed resolutions were passed increasing the capital and altering the articles of association.

The Anglo-Argentine Tramways Co., Ltd., held its annual meeting on Tuesday last when the Duke of Atholl (chairman), who presided, said that wasteful competition had caused further financial encroachment and had produced a disastrous position. The accounts for the year under review, before providing for any financial charges, revealed a substantial loss. The number of passengers carried was 347,000,000, and the receipts totalled 32,823,496 pesos, these being decreases on the previous year's figures of 18,000,000 and 2,000,000 respectively. These figures emphasised the need for a complete revision of the bases on which the transport organisation of Buenos Aires rested. Increased attention had been given to augmenting the speed and comfort of their cars, the rearrangement of routes, acceleration and intensification of services in the subway, and other means of improving the services, but so long as the conditions now ruling were allowed to persist these measures could not restore the finances of the company to the level which common equity and the interests of the city demanded. The necessary Bill for the co-ordination of the transport services of Buenos Aires was now in the hands of the Argentine Congress.

Allen West & Co., Ltd., have issued accounts covering the six months ended January 31st last. These show a trading profit of £10,771, as compared with a loss of £9,210 for the twelve months ended July, 1934. After crediting investment income and meeting interest charges, &c., the profit remaining is £5,718, which is applied in reducing the debit balance brought forward on profit and loss account to £254,635. No provision, however, has been made for depreciation for the six months, and it is stated that the profit of £5,718 is not sufficient to cover this charge. The value of orders being received has increased since the date of the accounts, and the company is now definitely running at a profit. In future the company's financial year is to end on January 31st.

The Greater London and Counties Trust, Ltd., and its subsidiary and controlled companies show an operating revenue for 1934 of £2,839,870 and expenses of £1,142,972, leaving £1,696,898. According to the *Financial Times* the net operating income of the Trust and earnings accruing to ordinary shares owned by it was £226,564. The Trust is controlled by the Utilities Power & Light Corporation, Canada, and holds 73 per cent. of the ordinary shares of Edmundson's Electricity Corporation, which controls over 66 electricity supply companies in England. The Atlas Corporation recently acquired control of the Utilities Power & Light Corporation.

Sheffield Steel Products, Ltd., reports a profit on trading for the ten months to March 31st last of £39,041, as compared with £39,438 for the preceding twelve months, and after deducting debenture interest, &c., there is a credit balance of £6,687, which is carried to debit balance on profit and loss account, bringing that item down to £21,726. The report states that the company continued to earn profits in the current year and, provided there is no setback, the directors expect to be able to carry out the provisions of the supplemental trust deed of February 14th, 1933, by paying two years' debenture interest on November 21st next, thus clearing off all arrears of interest.

W. & T. Avery, Ltd.—Presiding at the annual meeting on July 23rd, Sir J. Fortescue Flannery (chairman), in the course of his speech said that steady progress had been made throughout the year. The weighing machine industry had undergone rapid development and to-day was made to operate switches, to control flow, and to record results with accuracy and precision. At an extraordinary meeting which followed resolutions were passed for the transfer of £100,000 from reserves to a staff pension fund and for the capitalisation of £142,363, by the distribution among the ordinary shareholders of one new £1 ordinary share for every five ordinary shares held.

Falk, Stadelmann & Co., Ltd., report a profit for the year ended March 31st last, including income from profit on realisation of investments and transfer fees, and after providing for depreciation, &c., of £110,330, as compared with £96,502 in the preceding year. To this is added £15,169 brought in, and it is proposed to place £15,000 to general reserve, £5,000 to staff pension and benevolent fund, and to pay a dividend for the year of 8½ per cent. on the ordinary shares (against 7½ per cent.), leaving £18,951 to be carried forward.

Croydon Cable Works, Ltd., reports that the profit on trading, with interest and transfer fees, for 1934 amounted to £23,393, which with £6,214 brought in makes £29,607. The dividend for the year is maintained at 5 per cent. and £18,442 is carried forward.

The London Electric Transport Finance Corporation, Ltd.—The subscription list for the issue of £32,000,000 of 2½ per cent. guaranteed debenture stock, which was opened on Wednesday morning last week, was closed in a little more than an hour, having been substantially over-subscribed.

Ismay Industries, Ltd.—The subscription list for the issue of 100,000 5½ per cent. cumulative first preference shares of £1 each at par and 100,000 ordinary shares of 5s. each at 6s. per share, which was opened on Monday of last week was closed on the same day, having been over-subscribed.

The North Metropolitan Electric Power Supply Co. has declared an interim dividend of 4 per cent. on the ordinary stock.

The Richmond (Surrey) Electric Light & Power Co., Ltd., has announced an interim dividend of 4 per cent. on the ordinary shares (same).

The County of London Electric Supply Co., Ltd., has declared an interim dividend of 3 per cent., less tax, on the ordinary shares (same).

The South London Electric Supply Corporation, Ltd., is paying an interim ordinary dividend of 3 per cent., less tax (unchanged).

The London Electric Supply Corporation, Ltd., is paying an interim dividend of 3 per cent. on the ordinary shares (unchanged).

The Bournemouth & Poole Electricity Supply Co., Ltd., is maintaining the interim ordinary dividend at 6 per cent.

The City of Buenos Ayres Tramways (1904), Ltd., is paying the usual quarterly dividend of 1s. 3d. per share, less tax.

The Shawinigan Water & Power Co. has announced a second quarterly dividend of 13 cents on the common shares.

Stocks and Shares

TUESDAY EVENING.

FINANCIAL columns in the daily newspapers bear so frequent evidence to the holiday conditions prevailing in Stock Exchange markets that any further reference to the same subject may be merely boring. Nevertheless, these conditions constitute one of the factors that affect fluctuations in prices and, therefore, they call for mention as a reason for the placidity which now characterises most of the industrial sections. There is generally some outstanding feature of interest, and this week the renewed activity in the new-issue market is outstanding. Towards the end of July the number of new prospectuses usually is a negligible quantity. This year, however, fresh offers of stocks and shares are of such frequent occurrence as to provoke a wonder as to where all the money comes from that absorbs the supply of new securities.

London Transport

Success waited upon the 32 million pounds' loan raised by the London Electric Transport Finance Corporation. The interest is low and the price high, but the huge amount of stock was over-subscribed. No doubt the banks and various Government departments took blocks of it, the redemption dates, 1950-1955, offering attraction. Moreover, the present-day investor is so keen upon conservation of his capital that income yield becomes a secondary consideration. The price, after being at a small discount, firmed up to "par"; that is, to 97 for the fully paid scrip.

The Bank of England opened the subscription-lists at 9 o'clock one morning, closed them one hour later upon the issue being subscribed, and posted the allotment-letters on the evening of the same day. This probably sets up a record in the way of promptitude in handling an enormous issue of stock. The Bank of England's system, whatever it is, must be unique in its capacity for carrying out such operations.

Debenture Stocks on Offer

There is a fair-sized line obtainable of the lately offered Yorkshire Electric 3¼ per cent. debenture stock. This came out at 100, and it can be bought at 101 free, at present, of stamp-duty. As the company has paid 8 per cent. dividend annually for more than ten years, and the interest on the debenture stock was covered ten times over by the 1934 profits, the stock may be safely considered gilt-edged. It is redeemable 1955-1965. London Power 3¼ per cent. debenture 1952-1972 stands at 101¼, North Eastern 3¼ per cent. debenture at 100. A few hundred pounds of North West Midlands Joint Electricity Authority stock 1950-1970 is on offer at 116. This pays £4 6s. per cent. without allowing for redemption.

Cable and Wireless

The public made ready response to the issue of the Cables Investment Trust debenture and preference stocks; the market in each started on Monday in this week. For the debentures the price quoted is about ¼ discount, but a premium of 1s. has developed on the preference, in which a good deal of business is taking place. The effect on the existing stocks of Cable & Wireless (Holding) has been slightly depressing. The price of the preference remains at 101, but that of the A ordinary has gone back to 26¼. It would seem that some of the holders of the latter stock were selling this in order to buy the new securities. Other issues in this market are inclined to be dull. Globe Telegraph ordinary shares eased off to 14½. Oriental Telephones at 3¾ have shed 1/16. The American group is uninteresting. Visitors from the other side appear to be a little undecided in their views regarding President Roosevelt, whose policy, they admit, must necessarily take some years to fructify. The American, like his modern English brother, is apt it may be to expect too much to happen too soon.

Anglo-Portuguese Telephone are a firm market at 31s. 9d. Telephone and General Trust ordinary shares are unchanged at 32s. 9d.; the 7 per cent. preference at 31s. 3d. are ex dividend.

Crompton Parkinson

Fluctuations in Crompton Parkinson shares are the outstanding feature in the market for equipment and manufacturing shares. The ordinary dipped to 61s. before a sharp recovery to 67s. 6d. ensued. The recent buyers are pinning their hopes to the expectation of a share bonus at the end of the company's financial year. It is perhaps exposing no State secret to repeat Stock Exchange gossip to the effect that an interim report had been prepared for circulation among the shareholders, but that, after mature deliberation, the board decided to make no statement at this present juncture.

Manufacturing and Equipment

Apart from the activity in Crompton Parkinson shares there has been a fair amount going on in those of other companies interested in the same branch of industry. Associated Electrical Industries ordinary shares are attracting a good deal of attention, round about 34s. 6d., on the hope of an increase in the previously paid 6 per cent. dividend. General Electric are also popular at the present time owing to the advance in the dividend to 10 per cent. and the general impression that the company is doing very well. Brush ordinary has gone back a point to 44½, but there is no particular interest being taken in the stock at the present time. British Insulated ordinary are 2s. 6d. better at 4½d. Johnson & Phillips at 39s. 6d. have regained their small decline of last week. Telephone Rentals gained a trifle, at 8s. 9d.; the new shares, with 5s. paid, are quoted at 6s. 3d. Shares in Broadcast Relay Services are attracting speculative interest at 6s. 9d.

British Aluminium

Lively debate circulates around the next dividend on British Aluminium ordinary shares. Prophecy ranges from 7½ per cent., the rate paid last year, to a possible 10 per cent. If the dividend is merely maintained at 7½ per cent. the current price of 41s. 6d. for the shares looks too high. A firm of brokers, not members of the Stock Exchange, strongly advises purchase of the shares for a rise to 50s. The firm offers to accept a deposit of 4s. per share from prospective purchasers. It does not say what will happen to the deposit money in the event of the price going back to 37s. 6d.

A line of £25,000 of the company's 4 per cent. debenture stock can be bought at 105 free of stamp-duty. Although the yield at this price is very meagre, the security for the capital and for the interest is extremely well covered.

An Absentee Tax

In view of the large conversion loan offered this week by the Commonwealth of Australia, it is of some interest to recall the endeavour to impose an absentee tax upon dividends paid by the Adelaide Electric Lighting Company. So far as personal knowledge goes, no great pressure has been applied to the collection of this tax. The latter has not been mentioned, of course, in connection with the Commonwealth loans, nor is it likely to be. But the proposal to tax absenteeism is by no means forgotten; it illustrates the folly—possibly the danger—of taking any step that may conceivably disturb the confidence of investors whose interests lie widely beyond the company immediately concerned.

Miscellaneous Matters

Atlas Trust ordinary remain a dullish market at 5s. 9d. The Greater London and Counties Trust which, with Edmundson's Electricity Corporation, is controlled by the Atlas Corporation through its acquisition of the Utilities Power & Light Corporation, reports a net operating income of £978,700 for 1934. In the list of electricity supply shares, Electric Supply Corporation ordinary are better at 3½ and North Metropolitan ordinary at 58s. 3d. Upon the latter shares an interim dividend of 4 per cent. has been again declared. Last week's gain of a florin in Babcock & Wilcox was partially lost, the price reacting to 2½. A good demand for Electric and Musical Industries lifted the shares to 27s. 3d. Canadian Marconis, too, are strong at 8s. Ericsson Telephone ordinary show a further gain, at 6⅛. On the other hand, small declines are marked in Telephone Condensers at 44s. and in International Automatic Telephones at 2½.

Share List of Electrical Companies

	Nom.	Dividend 1933.	Dividend 1934	Price. July 23.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	78/9	—	3 16 5
Brompton Ordinary	1	7	7	34/–	—	4 2 4
Charing Cross Ordinary	1	7	7	34/6	—	4 1 2
Chelsea	1	7	7	34/6	—	4 1 2
City of London	1	7½	7½	36/–	—	4 3 4
Clyde Valley	1	7	8	44/–	—	3 12 9
County of London	1	10½	10½	58/–	—	3 12 5
Edmundson's 7% Pref.	1	7	7	36/–	—	3 16 9
Elec. Dis. Yorkshire	1	9	9	49/–	—	3 13 6
Elec. Supply Corporation ...	1	11	11	3½	+1/16	3 10 5
Kensington Ordinary	1	7	7	34/6	+6d.	4 1 2
Lancs Light and Power	1	7½	7½	39/–	—	3 17 0
London Electric	1	7	8	38/–	—	4 4 3
Metropolitan	1	10	10	53/6	—	3 14 9
Midland Counties	1	7	7	39/6	—	3 10 10
Mid. Elec. Power	1	8	8	42/–	—	3 16 0
North Eastern Electric Ordinary	1	6	6	34/6	—	3 9 6
Do. 7% Pref.	1	7	7	36/–	—	3 17 9
Northampton	1	10	10	53/9	—	3 14 1
Notting Hill 6% Pref.	10	6	6	14½	—	4 1 4
North Met. Elec. Ordinary ...	1	10	10	58/3	+9d.	3 9 0
Do. do. 6% Pref.	1	6	6	32/–	—	3 15 0
St. James and Pall Mall	1	7	8¼	34/–	—	4 17 1
Scottish Power	1	8	8	42/6	—	3 15 4
South London	1	7	7	35/–	—	4 0 0
Westminster Ordinary	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	44/–	—	3 12 9
PUBLIC BOARDS.						
Central Electricity, 1950–70 ...	Stock	5	5	117	—	4 5 6
Do. 1955–75 ...	,,	5	5	119	+½	4 4 0
Do. 1951–73 ...	,,	4½	4½	110	—	4 1 10
Do. 1963–93 ...	,,	—	3½	104	—	3 7 0
London & Home Counties, 1955–75	,,	4½	4½	112	—	4 0 6
London Passenger Transport, A...	,,	—	4½	124½	—	3 12 3
Do. do. B...	,,	—	5	127½	—	3 18 9
Do. do. C...	,,	3	—	98	–½	3 1 3
West Midlands Joint Elec. 1948–68	,,	—	5	115	—	4 7 0
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$100	9	9	128½	+2	7 0 0
Anglo-Am. Tel. Pref.	Stock	6	6	115½xd	—	5 3 10
Do. Def.	,,	1½	1½	27½	—	5 9 1
Cable & Wireless 5½% Pref. ...	,,	2¾	4½	101	—	4 2 2
* Do. A. 7½% Ord.	,,	Nil	Nil	26½	–1	—
Do. B. Ord.	,,	Nil	Nil	8	–½	—
Globe Tel. & Tel. Ord.	10	2½	3½	14½	–½	2 8 3
Do. do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	39	—	5 5 3
Marconi-Marine	1	10	7½	32/6	—	4 12 4
Oriental Telephone Ord.	1	12	12	3½	–1/16	*3 13 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	2/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	1100	—	—
Do. do. Pref. Ord.	,,	8	8	176½	—	4 10 8
Brazil Traction	100	—	—	8½	—	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	98½xd	—	5 1 6
Mexican Light Common	100	Nil	Nil	3	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	44½	—	—
Victoria Falls Ord.	1	20	20	8¾	—	2 6 8
Yorkshire (West Riding) ...	1	5	6½	33/9	—	3 17 8
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	15	3	—	5 0 0
Assoc. Elec. Ord.	1	4	6	34/6	+6d.	3 9 7
Do. Prf.	1	8	8	37/6	—	4 5 4
Babcock & Wilcox	1	6	8	50/–	–1/–	3 4 0
British Aluminium Ord.	1	5	7½	41/6	+6d.	3 12 2
British Insulated Ord.	1	5	15	4¾	+¼	3 8 6
Brush Ord.	Stock	Nil	Nil	44½	–1	—
Callender's	1	15	15	3¾	—	4 0 0
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord. ...	5/–	—	12½	3¾	+1/16	0 18 6
Do. 8% Pref.	1	8	8	36/3	—	4 8 8
Edison Swan 1st Pref.	1	7½	7½	27/6	—	5 9 0
Electric Construction	1	Nil	3¾	22/6	—	3 2 2
Enfield Cable Ord.	1	25	25	5½	—	4 17 6
English Electric	1	Nil	Nil	16/3	—	—
Do. do. Pref.	1	Nil	Nil	21/3	—	—
Ever Ready	5/–	35	35	21/–	—	8 6 8
Ferranti Pref.	1	7	7	28/3	—	4 19 0
G.E.C. Pref.	1	6½	6½	35/–	—	3 14 4
Do. Ord.	1	8	10	57/–	—	3 10 2
Henley's	1	30	30	6⅛	—	4 9 7
Do. 4½% Pref.	5	4½	4½	5¾	—	3 16 8
India-Rubber Preferred	1	—	5½	1¼	—	4 17 9
Johnson & Phillips	1	5	7½	39/6	+9d.	3 16 0
Siemens Ord.	1	6½	4	1⅛	—	3 7 5
Telegraph Construction	£1	Nil	Nil	1¾	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

26344. "Television or like systems." J. L. Baird, and Baird Television, Ltd. September 25th, 1933. (430900.)

26414. "Method and equipment for transmitting electrical test values." E. Regli and H. Sulzer. September 27th, 1932. (431047.)

29190. "Automatic volume control for radio receivers." E. K. Cole, Ltd., and A. W. Martin. October 21st, 1933. (430743.)

30908. "Electric lamp bulbs." B. B. Fenn. December 22nd, 1933. (430822.)

33806. "Trolley-pole current-collectors for electric vehicles." English Electric Co., Ltd., and P. L. Mardis. December 1st, 1933. (431053.)

35223. "Thermostatically controlled apparatus." Marconi's Wireless Telegraph Co., Ltd., and H. J. H. Wassell. December 14th, 1933. (430746.)

35898. "Automatic or semi-automatic long-distance telephone or other electric signalling systems." Standard Telephones and Cables, Ltd. (M. den Hertog and J. Kruithof). December 20th, 1933. (430753.)

36027. "Telephone and like installations." Fuld and Co. Telephon-und Telegraphenwerke Akt-Ges. December 21st, 1932. (430824.)

36098. "Dynamo-electric machines." J. Zetzsche and Supra Electra Motors, Ltd. December 22nd, 1933. (430910.)

36342. "Electric discharge rectifiers and the like." Akt-Ges. Brown, Boveri and Cie. December 24th, 1932. (430915.)

36361. "Electron lens systems." G. Hertz and F. G. Houtermans. December 24th, 1932. (431057.)

36405. "Control of electric-discharge appliances with gas or vapour filling." Akt-Ges., Brown, Boveri and Cie. December 24th, 1932. (Addition to 430915.) (430919.)

36416. "Electro-acoustic translating-devices such as loud-speakers." Electrical Research Products, Inc. January 6th, 1933. (430921.)

36496. "Trunk communication cable installations for the transmission of high-frequency currents." Siemens and Halske Akt-Ges. December 28th, 1932. (Cognate applications 36497-33 and 36499-33.) (430992.)

36635. "Thermionic valves." S. F. Warren. December 29th, 1933. (431061.)

1934

17. "Crystal-controlled thermionic valve oscillator." Dr. K. Heegner. January 4th, 1933. (431068.)

2617. "Electrical switching apparatus for battery charging." Accumulatoren-Fabrik Akt-Ges. January 25th, 1933. (430835.)

2755. "Electric furnaces." Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny and Cirey. January 30th, 1933. (Addition to 400020.) (431004.)

3390. "Direct-current electric circuits employing fine wire coils." R. H. Coates and Associated Electrical Industries, Ltd. February 1st, 1934. (430763.)

3445. "Telephone systems." General Electric Co., Ltd., J. E. Collyer and J. Scowcroft. February 2nd, 1934. (431005.)

3588. "Tuning-arrangements for superheterodyne radio receivers." E. K. Cole, Ltd., A. W. Martin and H. Hunt. February 3rd, 1934. (431006.)

5058. "Capping of electric lamps and the like." General Electric Co., Ltd., and L. G. Pennell. February 15th, 1934. (430840.)

6755. "Wireless receiving systems." A. C. Cossor, Ltd., and J. H. Reyner. March 2nd, 1934. (430841.)

7115. "Apparatus for charging electrical accumulators." A. E. Morrison and Sons, Ltd., A. E. Morrison and A. C. Morrison. March 6th, 1934. (431009.)

9257. "Electric carrier signalling systems." A. C. Timmis. March 24th, 1934. (431010.)

9570. "Electrical insulating tape." H. D. Symons, and H. D. Symons and Co., Ltd. March 27th, 1934. (431085.)

9883. "Electric spot-welding machines." F. C. Hohs and New Process Welders, Ltd. March 29th, 1934. (430768.)

11677. "Trolley-pole current-collectors for electric vehicles." English Electric Co., Ltd., and H. B. Wood. December 1st, 1933. (Divided out of 431053.) (431092.)

12783. "Indirectly-heated cathodes for electron discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 13th, 1933. (430853.)

12915. "Television systems." W. W. Triggs (Communication Patents, Inc.). April 28th, 1934. (430940.)

13161. "Vapour electric convertors." General Electric Co., Ltd., and E. Gallizia. May 1st, 1934. (430855.)

19119. "Electrically operating liquid level indicators." Fairey Aviation Co., Ltd., and G. Lyon. June 28th, 1934. (430860.)

20987. "Illumination control devices." Weston Electrical Instrument Corporation. March 10th, 1934. (430864.)

25433. "Electromagnetically operated electric relays." A. M. Haslev. September 12th, 1933. (430780.)

27502. "Radio receiver." Hazeltine Corporation. October 3rd, 1933. (430787.)

27524. "Voltage-indicating means for transformers." British Thomson-Houston Co., Ltd. September 28th, 1933. (431017.)

28766. "Electric motors." Howell Electric Motors Co. November 4th, 1933. (431018.)

30636. "Method of and apparatus for charging accumulator batteries in series." Britannia Batteries, Ltd. (Accumulatoren-Fabrik Akt-Ges.) October 25th, 1934. (430791.)

30728. "Electron-discharge devices." Rogers Radio Tubes, Ltd. December 1st, 1933. (431019.)

30805. "Loudspeakers." Rola Co. February 28th, 1934. (Divided out of 13430/34.) (430957.)

31522. "Radio-electric musical instrument." Musique Electro-Synthetique, E. E. Coupleux and J. A. Givelet. November 2nd, 1934. (430874.)

31729. "Arrangements for electric braking of three-phase alternating-current motors." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitäts Ges.). November 5th, 1934. (430875.)

32540. "Electric-discharge tubes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. November 13th, 1933. (430797.)

33346. "Lightning conductor device for use in connection with wireless aerials." K. T. Hardman and Central Equipment, Ltd. November 20th, 1934. (430800.)

33399. "Electromagnets." British Thomson-Houston Co., Ltd. November 22nd, 1933. (430883.)

33805. "Electric furnaces." Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny et Cirey. January 30th, 1933. (Divided out of 431004.) (431021.)

34829. "Regulating transformers." Siemens Schuckertwerke Akt-Ges. December 4th, 1933. (430966.)

37212. "Portable electric lamps." W. W. Triggs (Koehler Manufacturing Co.) July 24th, 1934 (Divided out of 21675/34.) (430968.)

1935

671. "Electromagnetically operated driving devices." Siemens-Schuckertwerke Akt.-Ges. January 24th, 1934. (431033.)

1616. "Cathode-ray tubes." Fernseh Akt-Ges. January 17th, 1934. (430809.)

3350. "Supersonic heterodyne receivers with circuits of intermediate frequencies." Ideal Werke Akt.-Ges. fur Drahtlose Telephonie. February 15th, 1934. (431039.)

4809. "Radio receiver." Hazeltine Corporation. October 3rd, 1933 (Divided out of 430787.) (431121.)

5628. "Electric batteries." Compagnie Générale d'Electricité. March 19th, 1934. (430897.)

6609. "Electric-motor driven clutch mechanisms." E. Bauer Ges. March 3rd, 1934. (430812.)

8905. "Electrolytic meters." Siemens-Schuckertwerke Akt-Ges. April 27th, 1934. (430815.)

10723. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 4th, 1934. (430975.)

12040. "Electric signalling systems." W. C. Davey. December 20th, 1933. (Divided out of 35870/33.) (430816.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 17th.

Acronal. No. 552956. Class 1. Solutions or emulsions of artificial resin for use as ingredients in manufactures.—I. G. Farben-Industrie Gesellschaft, Frankfurt-am-Main, Germany (British representative, Albert L. Mond, 19, Southampton Buildings, Chancery Lane, W.C.2.).

Polar-Ellarcold. No. 559014. Class 6. Refrigerating machines adapted for use in ships, and parts of such machines.—The Lightfoot Refrigeration Co., Ltd., Bush House, Aldwych, W.C.2, and the Liverpool Refrigeration Co., Ltd., Colonial House, Water Street, Liverpool.

Diavisor. No. 559450. Class 8. Apparatus for use in transmitting and/or receiving images and scenes, and/or sounds by television, telegraphy or telephony.—Televisor, Ltd., 58, Victoria Street, Westminster, London, S.W.1.

Ever-Ready Radio (lettering and design). No. 560474. Class 8. Dry batteries and cells (electrical) and accumulators (not for medical purposes).—The Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, London, N.7.

Transpero. No. 560948. Class 15. Electrical lighting glassware.—The Wholesale Fittings Co., Ltd., 23-27 and 37, Commercial Street, London, E.1.

Interohm. No. 560787. Class 50. Electrical insulating varnishes and electrical insulating substances of asbestos, mica, resins, oils, or bitumen.—The International Paint & Compositions Co., Ltd., 31-32, Grosvenor Place, Westminster, London, S.W.1.

The Profits of Electricity Undertakings

IN the House of Commons on July 16th Mr. Batey asked the Minister of Transport if he could state the combined profits of companies and local authorities and undertakings of the electricity industry for the years 1927 to 1934, giving the figures for each year separately.

Mr. Hore-Belisha said that the figures of gross surplus of authorised electricity undertakers (public authorities and companies) in Great Britain and of the appropriation thereof were as follows:—

Year.	Gross surplus.	Appropriation of gross surplus.	
		Interest and dividends.	Depreciation, etc., funds; debt redemption and other purposes including balances.
	£	£	£
1927–28	24,790,819	10,563,575	14,227,244
1928–29	25,855,868	11,652,271	14,208,597
1929–30	27,696,990	12,852,280	14,844,710
1930–31	28,643,384	13,546,213	15,097,171
1931–32*	31,879,627	14,422,091	17,457,536
1932–33*	33,534,110	14,807,148	18,726,962

* The figures of gross surplus in these years was arrived at before deduction of income tax charge; previously to 1931/32 it was arrived at after deduction of income tax.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Houses (44), Hilton; A. B. Gardner, city architect, 11, Broad Street.

Abingdon.—Houses, Kennington and Bayworth; A. B. West, The Knowl.

Acton.—Municipal buildings (£98,411); borough engineer.

Annan.—Houses (26); A. MacLellan, architect.

Ashton-under-Lyne.—Houses (100), near Rothwell Street and Thornton Road, Littlemoss; Arnold Morris, builder, The Firs, Smallshaw Lane.

Barrow-in-Furness.—Houses (100) and shops, Beacon Hill Estate; J. Whittaker (Builders), Ltd. Laundry, jute works site, Abbey Road; Barrow Steam Laundry Co., Ltd.

Bedford.—Houses (168), London Road Estate, and town hall, Modern School site; borough engineer.

Bellshill.—Houses (142); Wm. Chapman, housing engineer, 13, Clydesdale Street, Hamilton.

Bolton.—Extensions to St. Thomas's School, Escrick Street; trustees.

Bournemouth.—Houses (28), Holmfield Avenue; J. N. Hardy. Public baths, Pier Approach; K. M. B. Cross, architect, 45 and 46, New Bond Street, London, W.1. Senior school, East Howe; W. Potter & Son.

Bristol.—Premises, Temple Meads, for the W.H.S. Transport, Ltd.

Burton-on-Trent.—Cinema, High Street (electrical work), for Allied Kinema, Ltd., Birmingham; C. Massey, architect, Caroline Street, London, W.C.1.

Bury (LANCASHIRE).—Houses (150), Bridge Farm Estate; borough engineer.

Cambridge.—Guildhall (£152,793); Foster & Dicksee, builders, Rugby. Senior school (800 places), Perne Road; borough engineer.

Cardiff.—Domestic Sciences centres, Lansdowne Road, Splott Road, and Gladstone Council Schools, for E.C.; town clerk.

Chesterfield.—Houses (400), Brimington; W. Austin, Station Road, Brimington.

Coseley (STAFFORDSHIRE).—Houses (183), Burton Road, for Messrs. Mucklow.

Coulsdon.—Houses (23), Parkside Gardens; P. Richardson. Four branch libraries (£23,000); H. A. Gold, architect, 14, Bedford Row, London, W.C.1.

Coventry.—Houses (240); housing director.

Crayford.—Houses (194), Station Road; D. M. Mactavish, U.D.C. surveyor.

Darlington.—Houses (106), Bridge Street area, and extensions to Grammar School; E. Minors, borough engineer.

Dartford.—Houses (114), Stanham Farm Estate, and shops, Dartford Road; G. H. Giles, Ltd. Enlargement to hospital, for the Joint Hospital Board.

Dundee.—Cinema, Strathmartine Road, for the United Cinemas, Ltd., Glasgow; G. Singleton, managing director.

Durham.—Houses, Belmont, Brasside, and Quarrington Hill; R.D.C. housing architect.

Eccles.—Houses (40), Monton Fields Road; Wilham Estates, builders, 23, Brazennose Street.

Edinburgh.—Cinema, Wauchope Crescent (£15,000); Linton & Grierson, architects.

Flixton.—Houses (99), Jubilee Estate; J. Barker, builder, Millford Avenue.

Flockton (YORKSHIRE).—Houses (22), Park Side; U.D.C. surveyor.

Folkestone.—Houses (37), Radnor Street area; borough engineer.

Fort William.—Houses (24); F. W. A. Forrester, burgh surveyor.

Gillingham (KENT).—Houses (23), Woodlands Road, for H. Harris.

Grays.—Church, Bridge Road; Grays Pentecostal Mission.

Guildford.—Employment exchange, Chertsey Street; H.M. Office of Works.

Halifax.—Block of flats, Clare Road (electrical work), for Housing Improvements (Halifax), Ltd.; A. Pickles, architect, Hopwood Hall.

Harrow.—Houses (70), Berridge Estate; U.D.C. surveyor.

Hertfordshire.—Grammar school, Cheshunt (£35,840); county surveyor.

High Wycombe.—Houses (28), Stokenchurch; C. Jefferson & Co., builders.

Hyde.—Enlargement of hospital; borough engineer.

Irish Free State.—(CASHEL, Co. TIPPERARY).—Houses (38); J. Connolly, architect, Cashel. (DONNYBROOK, DUBLIN).—Business premises, for Dunne & Sons; R. M. Butler, architect, 82, Merrion Square, South Dublin.

Kenley (SURREY).—Houses (24), Oaks Road; W. J. Burstow.

Kent.—School, Lydden; E. Salter Davies, director of education, Maidstone.

Kilmarnock.—Maternity hospital (£20,000); medical officer.

Lancashire.—Senior girls' school, Westhoughton (£18,515), for County E.C.

Lichfield.—Houses (100), Curborough Road; city surveyor.

Lincoln.—Cinema, music hall, arcade of shops and restaurant (electrical work), £100,000; Associated British Picture Corporation, Ltd., Regal Cinema, Lincoln.

Littlehampton.—Cinema, High Street, for Odeon Theatres, Ltd., Birmingham.

London.—(KENNINGTON).—Tenements, Park Estate (£25,600); L.C.C. architect. (STOKE NEWINGTON).—Cinema, Stoke Newington Road; Associated British Cinemas, Ltd., 30, Golden Square, W.1. Factories, Masons Court, High Street; Holland, Hannen & Cubitts, Ltd., 1, Queen Anne's Gate, S.W.1. Shops and offices, 310-2, Seven Sisters Road; J. Ambrose Dartnall, architect, 11, Dowgate Hill, E.C.4. Extensions to town hall (£78,367); Foster & Dicksee, Ltd., 33, Davies Street, W.1. (WESTMINSTER).—Buildings at the corner of Marsham Street and Wood Street; Housing Corporation of Gt. Britain, Ltd., 50, Pall Mall, S.W.1.

Madeley (SHROPSHIRE).—Houses (32), Hill Top; Pershore & Gregory, builders, Willenhall.

Manchester.—Houses (25), Hawthorn Road and Cartwright Road, Chorlton-cum-Hardy; W. Farley, 117, Old Hall Lane, Fallowfield. Houses and shop, Queensway and Kingsway, East Didsbury; B. B. Bender, 31, Gt. Clowes Street, Broughton.

March.—Houses (44); U.D.C. surveyor.

Melton Mowbray.—Houses (32), Wellby Lane; W. H. Jarvis, U.D.C. surveyor.

Middlesbrough.—Houses, Brambles Farm Estate and on the Whinney Banks Estate; borough engineer.

Middleton.—Houses (44), near Jubilee Road and Cheetham Avenue; F. & H. Simpson, King Street and High Street. Houses (38), Tonge Vale Mill; Walton & Co., builders, Wellington Street, Oldham.

Midhurst (SUSSEX).—Houses (40); T. Greenfield, R.D.C. surveyor, Carron Lane.

Nailsworth.—Houses (20); Messrs. Beard, builders.

Newcastle-on-Tyne.—Houses (252), Buckingham Street; H. Kindred, Rosevale, Sunniside, Whickham, Co. Durham.

Newcastle (STAFFORDSHIRE).—Houses (60), Northwood Lane; T. Bailey & Co., Ltd., builders, Bank House Road, Hanford, Stoke-on-Trent.

Northern Ireland.—(OMAGH).—Technical school for E.C.

Norton.—Houses (34); R.D.C. surveyor.

Oban.—Houses (72), Dalintort; D. Galloway, burgh surveyor, Municipal Buildings.

Paignton.—Houses (94), St. Mary's Park Estate; J. H. Maunder.

Paisley.—Houses (160), Blackstoun Road; burgh surveyor.

Pontypool.—Houses (50), Panteg area; U.D.C. surveyor.

Preston.—Houses (30), construction of roads and sewers, for D. Ainsworth, Waverley Park Estate; A. C. H. Lillie, architect, Burn Edge, Bamber Bridge.

Purfleet.—Cement works, West Thurrock, for A. J. Wattie & Co., Ltd.

Richmond (SURREY).—Houses (164), Lock Road, Ham; Partridge & Daniel.

Romford.—Church, Rush Green; Methodist Authorities.

Rushall (STAFFORDSHIRE).—Houses (30), Stoke Street; J. Brookes & Co., Daw End Lane.

Salford.—Senior school, Broughton (£50,000); city engineer.

Salisbury.—Cinema (2,000 seats), opposite Old Palace Theatre; Allied Kinema, Ltd.

Sanderstead.—Houses (36), Ingleboro Drive; John Laing & Son, Ltd.

Scunthorpe.—Houses (50), Crosby Estate; W. Farrar, surveyor, Council Offices.

Seaford.—Houses (50); E. A. Lister, U.D.C. surveyor.

Selsdon (SURREY).—Houses (70), Old Farleigh Estate; Richard Costain, Ltd.

Shropshire.—Police station and quarters, Market Drayton; county architect, Shrewsbury.

Sittingbourne.—Houses, Hawthorn Orchard Estate; Mr. Wraight, builder.

Southend-on-Sea.—Swimming bath (£140,000); borough surveyor.

South Queensferry.—Houses (32), Hopetown Road; C. S. Paterson, burgh surveyor, Council Chambers.

Standish (LANCASHIRE).—Houses (46), Avondale; U.D.C. surveyor.

Stockton-on-Tees.—Houses (20), Chaburn Road; Lane, Fox & Co., builders, Norton-on-Tees. Houses (150), Northcote Hill; T. E. F. Whitear, builder, 2, Harland Place.

Stourbridge.—Extensions to Institute, including assembly hall, library, shops, &c.; Webb & Gray, architects, High Street, Dudley.

Stretford.—Stores, Longford Road; Forest City Electric Co., Ltd. Extensions to works, Chester Road; H. & J. Quick.

Sunderland.—Houses (24), Bainbridge Holme Estate; G. T. Brown & Son, architects, 51, Fawcett Street. Houses (20) for R.D.C.; J. Prentice, builder.

Swansea.—Additions to works, Neath Road; British Electric Repairs, Ltd.

Taunton.—Houses (24), near Cheddon Road, for W. J. Redman.

Thirsk (YORKSHIRE).—Houses (44), Sowerby; C. W. C. Needham, architect, 3, Duncombe Place, York.

Thornton Heath.—Factory, Thornton Road; R. & A. Main, Ltd.

Troon.—Houses (20); M. S. Brodie, burgh surveyor, Town House.

Twickenham.—Houses (36), Chertsey Road and Fulwood Gardens; G. L. Russell, architect. Houses (78), Rydal Gardens; L. A. Culliford, architect.

Uttoxeter.—Houses (41), Timber Lane site; U.D.C. surveyor. Cinema, for Mrs. F. Stebbings and F. P. Birch, Ashbourne; Ward & Godbehere, builders.

Wakefield.—Houses (150), Lupset Estate; G. Crook & Sons, Ltd. Extensions to Cathedral schools; Provost of Wakefield. Extensions to works, Thornhill Street; Drake & Warters.

Warlingham.—Enlargement to Mental Institution; J. M. Sheppard, architect.

Warminster.—Houses (34); T. W. Snailum, architect, Church Street, Trowbridge.

Weston-super-Mare.—Houses (28), Worle; Blake Bros., builders. Houses (64), Bourneville site; H. A. Brown, U.D.C. surveyor.

Wolverhampton.—Houses (250), Corporation Estates (£67,000); A. M. Griffiths & Son, Ltd. Block of shops, Salop Street; Hortons Estates, Ltd. Extensions to works, Graisley Row; S. J. & E. Fellows, Ltd.